Bureau of HIV/AIDS STD and TB
Centre for Infectious Disease Prevention and Control
Health Canada

HIV/AIDS Epi Updates

May 2001

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Health Canada Santé Canada

Division of HIV/AIDS Epidemiology and Surveillance
Bureau of HIV/AIDS, STD and TB
Brooke Claxton Building, Room 0108B
Tunney's Pasture, PL 0900B1
Ottawa, Ontario, K1A 0L2
Tel: (613) 954-5169
Fax: (613) 946-8695

Information to the readers of HIV/AIDS *Epi Updates*

The Division of HIV/AIDS Epidemiology and Surveillance of the Bureau of HIV/AIDS, STD and TB, Centre for Infectious Disease Prevention and Control, Population and Public Health Branch, Health Canada, is pleased to provide you with the May 2001 publication of HIV/AIDS *Epi Updates*.

As part of its mandate, the Bureau of HIV/AIDS, STD & TB conducts national surveillance and research on the epidemiology and laboratory science related to HIV/AIDS, sexually transmitted diseases (STD) and tuberculosis (TB). As part of this mandate, *Epi Updates* are compiled to summarize recent trends and developments related to the HIV epidemic in Canada.

This publication includes several new *Epi Updates* and a number of *Epi Updates* that have been updated for May 2001. In addition, the information contained in two *Epi Updates* included in previous versions of this publication ("AIDS and HIV in Canada" and "Positive HIV Test Reports in Canada") is now included in the surveillance publication entitled "HIV and AIDS in Canada. Surveillance Report to December 31, 2000" published in April 2001. All *Epi Updates* and the Surveillance Report are available at the address noted above and also at our website: www.hc-sc.gc.ca/hpb/lcdc/bah.

The HIV/AIDS *Epi Updates* are complementary to other Bureau materials which are also available at the website.

Sincerely,

Chris Archibald MDCM, FRCPC
Chief

Canada

HIV/AIDS
Epi Updates

May 2001

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HIV/AIDS *Epi Update*

Bureau of HIV/AIDS, STD and TB Update Series
Centre for Infectious Disease Prevention and Control

May 2001

National HIV Prevalence and Incidence Estimates for 1999: No Evidence of a Decline in Overall Incidence

At a Glance

- **An estimated 4,190 persons in Canada were newly infected with HIV in 1999.**
- **From 1996 to 1999, there was a 30% rise in incident HIV infections among MSM and 27% drop among IDU.**
- **An estimated 49,800 people in Canada were living with HIV (including AIDS) at the end of 1999.**
- **There was a 24% increase in prevalent infections from 1996 to 1999.**

Introduction

This report outlines estimates of the total number of Canadians who were living with HIV infection at the end of 1999 **(prevalence)** and the number of individuals who became newly infected in 1999 **(incidence)**. It updates estimates produced in 1996. National estimates of HIV prevalence and incidence are an integral part of the work produced by the Bureau of HIV/AIDS, STD and TB. They are used as a tool to monitor the HIV epidemic, to help evaluate and guide prevention efforts and are part of on-going risk assessment and management work conducted by the Bureau.

Methods

HIV prevalence and incidence estimates at the national level are estimated by a combination of different methods using data from a wide variety of sources, such as AIDS case reports, provincial HIV testing databases, population-based surveys, targeted epidemiological studies and census data.

Prevalence and incidence estimates are derived separately for the following exposure categories: men who have sex with men (MSM), injecting drug users (IDU), MSM-IDU, heterosexuals (includes sub-categories of heterosexual contact with a person at risk for HIV, origin in a country where HIV is endemic and heterosexual as the only identified risk) and other (includes recipients of clotting factor or blood products, perinatal and occupational transmission).

Two main methods are used to estimate both HIV prevalence and incidence: a direct and an indirect method.

Direct method:[1,2]

HIV prevalence:

Prevalence rate * Estimated population size

HIV incidence:

Incidence rate * Estimated population at risk (total population for that group minus those already infected with HIV).

- Prevalence and incidence rates are estimated from targeted epidemiological studies;

- Population sizes are derived using a variety of methods, including projected population estimates, population-based surveys, and capture-recapture analyses (for IDU).

Indirect Method:[1,2]
Two indirect methods are used together to estimate HIV prevalence. They are both based on the number of HIV diagnoses (obtained from provincial HIV testing databases) and on information about HIV testing behaviour (obtained from population surveys).

- In the first method, the cumulative number of HIV diagnoses (minus cumulative AIDS deaths) is divided by the proportion of the population who have ever been tested for HIV.

- In the second method, the number of HIV diagnoses in 1999 is divided by the proportion of the population who are tested in a one-year period, and the result is then added to the cumulative number of HIV diagnoses to the end of 1998 (minus cumulative AIDS deaths) plus the estimate for 1999 HIV incidence.

HIV incidence is derived using an indirect method by taking the difference between the 1999 and 1996 prevalence estimates and adding 1997-1999 AIDS deaths. The result is an estimate of the number of new infections occurring during 1997-99 which is divided by three to estimate the number during 1999. See the references for a further description of the methods and results.

These methods are carried out for each of British Columbia (BC), Alberta (AB), Ontario (ON) and Quebec (PQ). These four provinces account for 85% of the population of Canada and for 95% of HIV and AIDS diagnoses in Canada. For each exposure category in these provinces, the mean of the direct and indirect methods is taken as the point estimate for both prevalence and incidence. Ranges of uncertainty are calculated using statistical simulation procedures.

The remainder of the provinces and territories are grouped into Saskatchewan/Manitoba/Northwest Territories/Yukon/Nunavut and the Atlantic provinces (Nova Scotia, New Brunswick, Prince Edward Island, and Newfoundland). The prevalence and incidence estimates for these two regions are extrapolated using estimates from BC, AB, ON and PQ and regional distribution of reported AIDS cases and positive HIV diagnoses.

Prevalence and Incidence Results

As outlined in Table 1, there were an estimated 49,800 people in Canada living with HIV infection (includes those living with AIDS) at the end of 1999 compared with an estimated 40,100 at the end of 1996. This represents an increase of 24%.

An estimated 4,190 Canadians became newly infected with HIV in 1999 (Table 2). Although the estimated incidence in 1999 was essentially unchanged from 1996, the distribution among exposure categories changed significantly. From 1996 to 1999, there was a 30% increase in the number of new infections per year among MSM (from 1,240 to 1,610) and a 27% decline in the number of new infections among IDU (from 1,970 to 1,430).

Table 1: Point estimates and uncertainty ranges for number of prevalent HIV infections in Canada at the end of 1999 compared with point estimates for 1996, by exposure category

	MSM	MSM-IDU	IDU	Hetero	Other	Total
1999	29,600	2,100	9,700	8,000	400	**49,800**
Range	(26,000-33,400)	(1,700-2,600)	(8,100-11,800)	(6,300-10,100)	(330-470)	**(45,000-54,600)**
1996	25,300	1,700	7,100	5,500	500	**40,100**

Table 2: Point estimates and uncertainty ranges for number of incident HIV infections in Canada in 1999 compared with point estimates in 1996, by exposure category

	MSM	MSM-IDU	IDU	Hetero	Other	Total
1999 Range	1,610 (1,190-2,060)	270 (190-360)	1,430 (1,030-1,860)	880 (610-1,170)	0	**4,190** **(3,310-5,150)**
1996	1,240	290	1,970	700	0	**4,200**

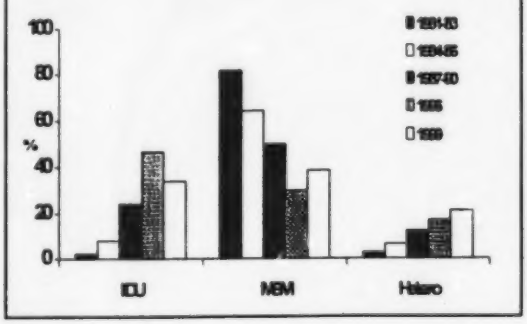
Tables 1 and 2 reflect a rise in the number of prevalent and incidence infections among heterosexuals. The estimated prevalent number of infections to 1999 is 8,000, 45% higher than the estimate of 5,500 in 1996. The number of new infections among heterosexuals increased 26% over this same time period, from 700 to 880 new infections per year.

An attempt was made to specifically evaluate the heterosexual subcategory 'endemic' to estimate what proportion of the epidemic can be attributed to individuals from a country where HIV is predominantly transmitted through heterosexual contact. Based on the proportions in reported HIV positive test reports and reported AIDS cases, it is estimated that this group represents approximately 20% to 30% of the heterosexual exposure category in the national prevalence and incidence estimates. It is important to note that there is considerable variation in this proportion between provinces, and that this estimate is quite uncertain since a large proportion of HIV test reports do not contain complete exposure category information.

Trends in Exposure Category among New Infections

The distributions of exposure categories among new HIV infections shown in Figure 1 clearly outline the changes in the HIV epidemic in Canada. Prior to 1999, the proportion of new infections attributed to IDUs had steadily increased from 2% during 1981-1983 to 24% between 1987-1990 to 47% in 1996. However, 1999 incidence estimates indicate that the proportion has now dropped to 34%. Conversely, the proportion of new infections attributed to MSM demonstrated a steady decline from over 80% in

Figure 1: Estimated exposure category distribution (%) among new HIV infections in Canada, by time period



1981-1983 to 30% in 1996. Recently, however, there has been a sharp increase in the proportion of new infections attributed to MSM to 38% in 1999. The proportion of new infections attributed to the heterosexual exposure category has increased steadily in the last two decades reaching 21% of new infections by 1999.

Trends among Women and Aboriginal Populations

An estimated 6,800 women were living with HIV infection (including those living with AIDS) at the end of 1999, a 48% increase from the 1996 prevalence estimate of 4,600. Thus, women accounted for 14% of the prevalent HIV infections in 1999 compared to 11% in 1996. The number of newly infected women remained just below 1,000 cases per year in both 1999 and 1996 (917 and 950

respectively) (Figure 2). In 1999, 54% of all new HIV infections among women were attributed to IDU and 46% were attributed to the heterosexual exposure category.

The estimated number of prevalent HIV infections among Aboriginal populations was 1,430 in 1996 and 2,740 in 1999, an increase of 91% (Figure 3). In 1999, 5.5% of all prevalent HIV infections in Canada were attributed to Aboriginal populations. There were 370 new infections in this group in 1999 (9% of all new HIV infections), 64% of which were attributed to the exposure category IDU, 17% were attributed to heterosexuals, 11% to MSM and 8% to MSM-IDU.

Figure 2: Estimated number of prevalent and incident HIV infections among women, by exposure category and year

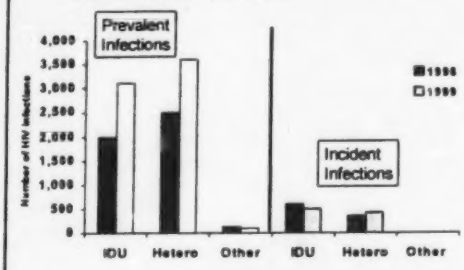
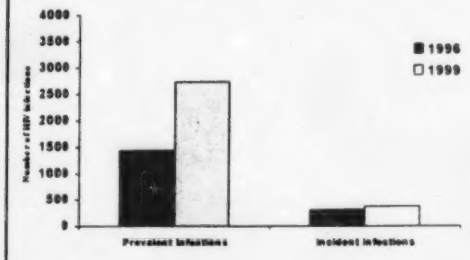


Figure 3: Estimated number of prevalent and incident HIV infections among Aboriginal populations, by year



Comment

The methods employed to estimate HIV prevalence and incidence make maximum use of a wide variety of surveillance and research data. The resulting estimates are necessarily imprecise, but the degree of certainty is improved by using several independent methods in a combined approach. The advantages of this approach are its flexibility and its ability to readily incorporate new data and to highlight gaps in existing knowledge. The fact that the methods to estimate national trends of HIV are largely determined by data from large cities is a major limitation. These estimates do not, therefore, necessarily reflect local trends of HIV incidence and prevalence in Canada.

The 1999 estimates clearly illustrate the changing face of the Canadian HIV epidemic. They highlight a potential resurgence of the epidemic among MSM and an increasing urgency of the situation among Aboriginal populations. Although the estimates indicate a reduction in incidence among IDUs, the absolute number of new infections per year is still unacceptably high in this exposure category.

These findings will be critical for the planning and evaluation of prevention and care programs in Canada. The 1999 estimates support the need to strengthen and improve these programs and provide further evidence of the importance of enhancing existing surveillance and analysis. Furthermore, results underscore the fact that it is not yet time to reduce vigilance with respect to HIV and AIDS in Canada.

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Prevalent HIV Infections in Canada: Up to One-Third May Not Be Diagnosed

At a Glance

- **There were an estimated 49,800 people living with HIV infection in Canada at the end of 1999.**
- **Of these, approximately 15,000 or 30% are not aware of their infection.**
- **Given the new treatments for HIV, it is more important than ever that all Canadians are able to access HIV testing.**

Introduction

This *Epi Update* presents the estimated number of Canadians who were HIV-infected but unaware of their infection at the end of 1999. It also summarizes available data on the characteristics of persons tested for HIV in Canada.

HIV Testing in Canada

Knowledge of one's HIV status can be useful for several reasons. Counselling received at the time of HIV testing can provide critical information about how to reduce the risk of HIV infection. If an individual is found to be HIV infected, consideration can be given to starting antiretroviral therapy. In the case of pregnant women, treatment can reduce the chances that the infant will be infected from about 25% to 8% or less.[1]

Canadians have had the opportunity to be tested for HIV infection in Canada since the test became available in 1985. Individuals have accessed HIV testing services through either coded or confidential testing at a doctor's office or clinic, or through anonymous testing sites.

Positive HIV test report data are provided by all provinces and territories in Canada to the Centre for Infectious Disease Prevention and Control (CIDPC) and are presented in the most recent semi-annual report: *HIV and AIDS in Canada: surveillance report to December 31, 2000.*[2] They are based on non-nominal, confidential HIV testing information with duplicate tests for the same individual removed to the extent possible. The removal of duplicates is necessary to accurately reflect the annual number of new HIV diagnoses. Duplicate removal rates vary by year, province and type of data (nominal, non-nominal or anonymous). It is important to note that in most provinces, the ability to remove duplicates has improved significantly since 1995.

HIV-Infected but Unaware

There have been approximately 46,000 positive HIV tests reported to CIDPC to December 31,

1999[2]. After adjusting for under and delayed reporting, it is estimated that about 51,000 Canadians have tested positive for HIV from 1985 (when testing became available) to the end of 1999. Of this total, an estimated 15,000-17,000 individuals had died by the end of 1999 (also adjusted for under and delayed reporting). Therefore, of this 51,000 approximately 34,000-36,000 individuals were aware of their HIV infection and were still alive at the end of 1999.

It is important to note that data on positive HIV tests only represent those who have tested positive for HIV infection and do not represent all persons who have been infected with HIV as some individuals who have been infected with HIV have not yet come forward for testing.

In November 2000, the Bureau of HIV/AIDS, STD and TB published estimates of HIV prevalence in Canada to the end of 1999.[3] It was estimated that approximately 49,800 Canadians were living with HIV infection (including those living with AIDS) at the end of 1999. This number includes those who are aware of their infection (had a positive HIV test) and those who are unaware of their infection.

The difference between the total number who were HIV-infected and alive at the end of 1999 (49,800) and the number who were aware of their HIV infection and alive (34,000-36,000) at the end of 1999 represents an estimate of the number of persons unaware of their infection (not yet tested positive for HIV) and alive. This difference is approximately 15,000 or about 30% of the estimated 49,800 Canadians living with HIV infection at the end of 1999.

Characteristics of Persons Tested for HIV

A Canada-wide survey conducted in January 1997 found that 18.6% of men aged 15 years and older and 16.2% of women aged 15 years and older had been tested for HIV (excluding tests for blood donation and insurance purposes)[4]. Of those tested, 39% had been tested in the year prior to the survey, 57% in the prior two years, and 43% had their most recent test more than two years prior to the survey.

A 1996 survey found that, taking into account ancillary testing such as donating blood or being tested for life-insurance purposes, 41% of men and 31% of women in Canada had ever been tested for HIV.[5]

National surveys of the general population suggest that those who report risk factors are more likely to be tested:

- Among heterosexuals, those with two or more partners in the last year were more likely to be tested than those with one partner (50.5% vs 17.4%). Of those who reported having had a sexually transmitted disease (STD) in the past five years, 58% had been tested compared to 17.4% of those who did not report an STD.[4]

- For men, testing was higher among those who had sexual intercourse with another man (71%), used injecting drugs (62%), received blood or clotting factor between 1978 and 1985 (27%), or had a partner with a risk factor (IDU, having received blood or clotting factor between 1978 and 1985, origin in from country endemic for HIV) (30%).[5] For women, testing was higher among those who had received blood or clotting factor between 1978 and 1985 (32%), had a high-risk partner (38%), or had sexual intercourse with a man since 1978 (17%).[5]

- Testing is highest among individuals aged 25 to 34 years. Even after taking into account all other risk factors, those aged $\geq$45 years are still less likely to be tested than are those <45 years.[4,5]

- Although those reporting risk factors such as IDU, multiple partners, or MSM are more likely to be tested, a substantial proportion of those reporting risk factors have not been tested recently, or have not been tested at all. For example, among those who report more than one partner in the last year and not using condoms consistently, 53% of men and 38% of women have never been tested.

Comment

Canadians with risk factors for HIV infection are more likely to have been tested for HIV than those without such risk factors. However, there is still a significant proportion of persons with risk factors who have never been tested for HIV. It has been estimated that there are approximately 15,000 people or 30% of the HIV-infected population who are unaware that they are infected. More information is needed about individuals who are at risk for HIV, but who have not been tested. Given these data, and the fact that new treatments are available for HIV infection, it is more important than ever that all Canadians be able to access HIV testing, particularly those at highest risk for HIV infection.

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For more information, please contact:

Division of HIV/AIDS Epidemiology & Surveillance
Bureau of HIV/AIDS, STD and TB
Centre for Infectious Disease Prevention & Control
Health Canada
Tunney's Pasture, Postal Locator 0900B1
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HIV Infection Reporting in Canada

At a Glance

- **HIV infection is reportable in all provinces and territories except in British Columbia and Quebec.**
- **HIV testing can be nominal, non-nominal or anonymous; however, anonymous testing is not available in all provinces & territories.**
- **HIV testing patterns in Canada, along with the profile of people being tested, provide important information for designing and targeting intervention programs.**

Introduction

In the spring of 1998, the Bureau of HIV/AIDS, STD & TB surveyed Canada's provinces and territories to determine where HIV infection is reportable and the types of HIV testing being offered[1]. The methodology and results of that survey were published in an *Epi Update* released in May 1999.

Although much of the information collected from that survey has not changed, this *Epi Update* provides the most up-to-date information on HIV infection reporting, and describes the jurisdictions in Canada where HIV infection is reportable, and the types of HIV testing, including anonymous HIV testing (AHT) that are available within each province and territory.

The most recent Canadian HIV and AIDS surveillance report indicates that the total number of AIDS cases and positive HIV tests reported in Canada since the beginning of the epidemic to December 31, 2000 are 17,594 and 48,014, respectively.[2] These numbers give some indication of the magnitude of the HIV/AIDS epidemic in Canada. However, these data do not reflect the full extent of the problem as they do not include HIV-infected persons who have not been tested and therefore, are still unaware of their infection. Details on the characteristics of persons tested for HIV are outlined in the May 2001 *Epi Update* entitled "Prevalent HIV Infections in Canada: Up to One-Third May Not Be Diagnosed."

HIV testing patterns within the general population, along with the profile of people being tested, are important for designing and targeting intervention programs[3], and for developing a context for HIV/AIDS surveillance data.

HIV Infection Reportable in Eight Provinces and Three Territories

Information regarding where HIV infection is reportable, as well as, the types of HIV testing services offered throughout Canada is summarized in Table 1.

- HIV infection is legally reportable in all provinces and territories except British

Columbia and Quebec. The majority of these provinces and territories had HIV reporting legislation in place by the mid- to late-1980s. Quebec is currently making HIV infection reportable.

- HIV reporting is governed by legislation enacted by each province or territory, and requires that 'nominal/name-based' or 'non-nominal/non-identifying' information about an individual who tests positive for HIV be forwarded to provincial/territorial public health officials.

- In most testing situations, laboratories and physicians are responsible for reporting HIV infection, but this varies by province or territory.

Table 1: HIV Testing and HIV Reporting by Province/Territory as of April 1, 2001.

Prov/ Terr	Type of HIV Testing Available	HIV Infection Reportable Since[1]	HIV Infection Reportable By:	Level of Reporting to the Prov/Terr
B.C.	N, NN, A	---	---	---
Yukon	N, NN	1995	P,	N
NWT	N, NN	1988	L, P, RN	N
Nunavut	N, NN	1999	L, P, RN	N
Alta.	N, NN, A	1998	L, P	NN
Sask.	N, NN, A	1988	L, P	NN
Man.	NN	1987	L, P	NN
Ont.	N, NN, A	1985	L, P	N, NN[2]
Que.	N, NN, A	---	---	---
N.B.	N, NN, A	1985	L, P, RN	NN
N.S.	N, NN, A	1985	L, P	N
P.E.I.	N, NN	1988	P, RN	N, NN
Nfld.	N, NN, A	1987	L, P	N

A = Anonymous, L = Lab, N = Nominal/Name-Based, P = Physician
NN = Non-Nominal/Non-Identifying, RN = Nurse
[1] Refers to legislation governing the type of HIV infection reporting to provincial/territorial health officials and the year it came into effect.
[2] In Ontario, HIV positive data from AHT are reported non-nominally at the provincial level.

Nominal/Name-Based and Non-Nominal/ Non-Identifying HIV Testing

- Nominal/name-based HIV testing is available in all provinces and territories except Manitoba. This service is available through many physicians by request.

- Non-nominal/non-identifying HIV testing is available in all provinces and territories. Testing can be accessed through physicians, community or public health clinics, STD clinics, sexual health units or nursing stations depending on the province/territory.

Anonymous HIV Testing

- As shown in Table 2, anonymous HIV testing (AHT) is available in eight provinces. AHT is offered through community or public health clinics, sexual health centres, and by some physicians.

- Anonymous testing may encourage more people to come forward for HIV testing and counselling since this practice offers the highest degree of confidentiality (i.e. personal identifiers are not requested or recorded).[4]

- Several studies in the United States have shown that AHT programs encourage people to be tested for HIV, especially those at high-risk or who would not volunteer for testing under nominal/name-based or non-nominal/non-identifying circumstances.[5,6,7]

- In its first year of operation, AHT sites in Ontario tested approximately 5% of the total tested population, and most often served individuals at high risk of HIV infection, especially men who have sex with men.[8]

Table 2: Status of Anonymous HIV Testing by Province/Territory as of April 1, 2001.

Prov/ Terr	AHT Since[1]	AHT Sites	AHT Data Reported[2]	Counselling Services Available
B.C.	1985	Any Physician 's Office	No	Yes
Yukon	---	---	---	---
NWT	---	---	---	---
Nunavut	---	—	—	---
Alta.	1992	3	Yes	Yes
Sask.	1993	3	Yes	Yes
Man.	---	---	---	---
Ont.	1992	34	Yes	Yes
Que	1987	60+	No	Yes
N.B.	1998	7	---	Yes
N.S.	1994	1	Yes	Yes
P.E.I.	—	—	---	—
Nfld.	**	6	Yes[3]	Yes[3]

** AHT is available upon request, but are not the official guidelines for the province/territory.

[1] Refers to the availability of AHT in the respective province/territory, and the year in which AHT was implemented.

[2] Refers to whether or not HIV positive test data from AHT is reported to the Bureau of HIV/AIDS, STD and TB, CIDPC, Health Canada.

[3] If someone tests positive for HIV through AHT, that individual then becomes part of the nominal/name-based system, where counselling, follow-up care and HIV data reporting are all done nominally.

Comment

All provinces and territories in Canada offer at least one form of HIV testing: 1) nominal/name-based; 2) non-nominal/non-identifying; and/or 3) anonymous testing. HIV infection is legally reportable in eight provinces and three territories, however, each of these has a different practice for reporting HIV infection. Although British Columbia and Quebec do not currently have legislation governing HIV infection reporting, these provinces are still able to collect some data about HIV infection from provincial HIV testing laboratories.

At present, nominal/name-based and non-nominal/non-identifying HIV testing is widely available in Canada, however, anonymous HIV testing is available in only eight provinces. Increased availability and accessibility to different types of HIV testing may allow individuals to choose the testing and counselling environment in which they feel most comfortable, thereby encouraging more people to be tested and facilitating the targeting of intervention and treatment programs.[9]

For more information on HIV testing, please contact your provincial or territorial public health department.

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For more information, please contact:

Division of HIV/AIDS Epidemiology & Surveillance
Bureau of HIV/AIDS, STD and TB
Centre for Infectious Disease Prevention & Control
Health Canada
Tunney's Pasture, Postal Locator 0900B1
Ottawa, Ontario K1A 0L2

Tel: (613) 954-5169
Fax: (613) 946-8695

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May 2001

HIV and AIDS Among Youth in Canada

At a Glance

- **Risk behaviour data among young Canadians show the potential for HIV transmission.**
- **Street-involved youth, youth who inject drugs, and young gay men are particularly vulnerable to HIV.**
- **A wide range of prevention activities needs to be implemented to help minimize the risk of HIV transmission among youth.**

Introduction

Youth, ages 10 to 24 years, are of particular importance with respect to HIV/AIDS. During this period of life, many behaviour patterns are established that will affect a young person's risk of HIV infection, both within this time span and throughout his/her adult years. Early intervention is an important step in helping youth to adopt and to maintain protective behaviours. A wide range of activities must be implemented in communities to help minimize the risk of HIV transmission among young Canadians. This *Epi Update* provides the most current information on the status of HIV and AIDS among Canadian youth and highlights data on sexual and drug-related risk behaviours among this population. Suggestions for prevention activities are also offered.

AIDS Data[1]

- As of December 31, 2000, a total of 17,594 AIDS cases had been reported to the Centre for Infectious Disease Prevention and Control (CIDPC). Of these, 601 (3.4%) were diagnosed among youth ages 10 to 24 years. Given the median length of time between HIV infection and the onset of AIDS (ten years or more), many individuals in older age groups would have been infected with HIV during their youth.
- As seen in Table 1, mode of infection varied by age. Exposure to infected blood or blood products accounted for most reported AIDS cases among individuals ages 10 to 19 years. In contrast, exposure categories among those ages 20 to 24 years were more similar to those reported among adults with AIDS (i.e., sexual transmission was the main route of exposure).

Table 1: Number of reported AIDS Cases with Associated Exposure Categories (%) for Individuals 10 to 24 Years of Age in Canada, Diagnosed up to December 31, 2000.

Category	10 -19 years of age	20-24 years of age
Number of Cases	82	519
Percentage of all reported AIDS cases	0.5%	3%
Associated Exposure Categories[1]	71% Blood & Blood Products 12% MSM 8% Heterosexual Contact/Endemic 5% IDU 4% MSM/IDU	52% MSM 17% Heterosexual Contact/Endemic 12% MSM/IDU 11% IDU 8% Blood & Blood Products

IDU = Injecting Drug Use, MSM = Men who have sex with men
[1]Pecentages based on the total number of cases minus those reports for which exposure category was unknown or "not identified."

HIV Testing Data[1]

- As of December 31, 2000, a total of 48,014 positive HIV tests had been reported to CIDPC. Of these, 630 (1.5%) were among youth ages 15 to 19 years, and 11,934 (27.5%) were among individuals ages 20 to 29 years (Note: HIV data received from the provinces do not currently allow separation of the 20 to 24 year age group.).

As with reported AIDS cases, the mode of infection varied by age among youth. Table 2 shows the distribution of exposure categories for HIV positive test reports received between January 1, 1999 and December 31, 2000. MSM, IDU, and heterosexual contact accounted for most cases in the 10 to 19 year age group. Among the 20 to 29 year age group, MSM and IDU were the most common exposure categories.

Table 2: Distribution of Exposure Categories Among Positive HIV Tests Reported between January 1, 1999 and December 31, 2000 for Individuals Ages 10 to 29 Years in Canada.

Category	10-19 years of age	20-29 years of age
Associated Exposure Categories[1]	41% MSM 41% IDU 12% Heterosexual Contact/Endemic 6% Blood & Blood Products	43% MSM 33% IDU 20% Heterosexual Contact 2% MSM/IDU 2% Blood & Blood Products

IDU = Injecting Drug Use MSM = Men who have sex with men
[1]Pecentages based on the total number of cases minus those reports for which exposure category was unknown, "other," or "not identified."

- A cumulative total of 685 positive HIV test reports had been received for individuals ages < 15 years by the end of 2000. In this group, perinatal transmission and exposure to infected blood and blood products accounted for over 90% of cases (Note: HIV data received from the provinces do not allow separation of the ten to 14 year age group before 1998.).

HIV Prevalence and Incidence Data Show Highest Risk is Among Street Youth, Youth Who Inject Illicit Drugs, and Young Gay Men

To date, only a limited number of studies have examined HIV prevalence or incidence among Canadian youth. Data from these investigations suggest that street-involved youth, youth who inject drugs, and young gay men are particularly affected by HIV infection:

- Among Winnipeg injection drug users, HIV prevalence was reported as 10.5% among those ages 20 to 24 years.[2]

- In the SurvIDU Network Study, the prevalence of HIV among male and female drug injectors ages 20 to 24 years was 4.1% and 3.0% respectively.[3]

- A prevalence rate of 0.25% was observed among young offenders ages 12 to 19 years in British Columbia, many of whom reported a history of injection drug use.[4]

- Studies of street youth ages 14 to 24 years in Montreal[5] and Toronto[6] found HIV prevalence rates of 1.4% and 2.3% respectively. HIV incidence among Montreal street youth was estimated at 0.55 infections per 100 youth during 1995-98.[5]

- In a survey of attendees of STD clinics in Ontario, an HIV prevalence of 0.1% was found among 15 to 19 year old males.[7] The prevalence among females in this age group was 0.04%.

- Among women seeking abortions in Montreal, the prevalence of HIV among those ages 20 to 24 years was 0.0015%, and there were no infections detected among women under 20 years of age.[8]

- Among male, street-involved youth in Montreal ages 13 to 25 years who reported having sex with men, the prevalence of HIV was 4.9%.[9]

- Sentinel hospital surveillance of HIV infection in Quebec,[10] a study of women seeking prenatal care in British Columbia,[11] and a survey of youth from across Canada involved in an international exchange program[12] reported prevalence rates of 0.04% to 0.08% among young people ages 14 to 25 years.

Risk Behaviour Data Among Canadian Youth Show the Potential for Increased HIV Transmission

Youth, particularly those who are street-involved, begin to have sexual intercourse at a relatively early age:

- For street youth and surveys of other higher risk populations (e.g. STD clinic attendees), the median age at first intercourse (AFI) ranges from 12 to 15 years of age.[13]

- According to the 1996 National Population Health Survey (NPHS), the median age at first intercourse has declined from 18 years for men born between 1942 and 1946 to 17 years for men born 30 years later. Over the same period, age at first intercourse for women has declined from 20 to 17 years.[14]

- While the cohort that was ages 15 to 19 years at the time of the 1996 NPHS survey was too young to permit calculation of the median AFI, the data suggest that a trend toward earlier AFI may be taking place for young women, but not for young men. According to the NPHS data, 25.6% of young women in the cohort born between 1977 to 1981 had intercourse by the age of 15 compared to 21.8% of women in the 5-year age cohort that preceded them. This contrasts with a decrease from 21.8% to 19.5% in the percentage of men in the same cohorts who had experienced intercourse by the age of 15 years.[14]

A substantial proportion of young people report having multiple sexual partners in the past year:

- Among sexually experienced, single respondents (those never-married, divorced and widowed) in the 1996 NPHS, 29.4% of males ages 15 to 19 years had had more than one sex partner in the past 12 months, and 27.5% of males ages 20 to 24 years had had more than one sex partner in this same time period. In comparison, 21.8% of females ages 15 to 19 years had had more than one intercourse partner in the past 12 months, and the same percentage of females (21.9%) ages 20 to 24 years had had more than one intercourse partner in this time frame.[14]

- In a 1993 survey of Ottawa street youth ages 15 to 20 years, 21% of boys and 26% of girls who were sexually active had had four or more partners in the past year.[15]

The results of school- and population-based surveys suggest that many Canadian youth are having unprotected sexual intercourse. In particular, not using condoms appears to be more common among young women than it is among young men:

- Among sexually active 15 to 19 year olds in the 1994 NPHS (excluding subjects who had a single sex partner and who were married, common-law, divorced, or widowed), 51% of females and 29% of males reported never or only sometimes using a condom in the past year.[16] The corresponding percentages among those ages 20 to 24 years were 53% and 44%.[16]

- In a 1993 survey of Ottawa street youth, only 27% of boys and 8% of girls ages 15 to 20 years reported that they had always used condoms in the last year.[15]

The extent of unprotected intercourse among youth is further captured in pregnancy and abortion rates among young women ages 15 to 19 years and in rates of chlamydia and gonorrhea among those ages 15 to 24 years:

- The pregnancy rate in young women ages 15 to 19 years in Canada in 1997 was 42.7/1000 women. The abortion rate in 1997 for females ages 15 to 19 years was 21.5/1000 women.

These rates are considerably higher than are those from a number of other developed countries.[17,18]

- Figure 1 shows that in 1999, the reported incidence of chlamydia in Canada was highest among females ages 15 to 19 years (1121.8/100,000 women). The reported incidence of gonorrhea in Canada was also highest among this group of young women (80.3/100,000).[19,20]

Research reveals that levels of injecting drug use and injecting risk behaviours among youth require ongoing assessment:

- An ongoing study of street youth in Montreal found that 47.3% had injected drugs in their lifetime. Also alarming was the incidence of initiation of injecting drug use in this cohort of street youth, estimated to be 7.9 per 100 person-years.[21]

- In the ongoing Ontario Student Drug Use Survey, the proportion of sampled students reporting needle sharing in the previous year has remained below 0.5%. Although small, this percentage represents approximately 2,000 Ontario students in 1997 who were potentially exposed to HIV because they injected drugs with a needle that had been used by someone else.[22]

Is it Time to Take the Test? - HIV Testing Behaviour Among Youth

Recent data suggest that a fairly large proportion of youth have sought HIV testing:

- According to a 1997 survey across Canada[13], 8.2% of boys and 19.6% of girls ages 15 to 19 years had ever been tested for HIV. A 1995 survey showed that 18% of women and 22% of men ages 15 to 24 years had been tested for HIV either through blood donation, insurance testing, or voluntary testing.[23]

Comment

HIV/AIDS is affecting many subgroups of the Canadian population, including youth. Although the limited data that are available suggest that HIV prevalence is currently low among youth, sexual behavior and STD data clearly indicate that the potential exists for the spread of HIV among young Canadians. Better epidemiological and behavioural data are needed to fully assess the risk of transmission among youth and to help guide and evaluate prevention and care programs for young people. Comprehensive school-based programs that provide information, such as how sexually active young people can protect themselves against HIV and other STDs, are critical for reaching youth before behaviours are established. Addressing the needs of out-of-school youth (such as those who are street-involved) is also important and will require a concerted effort by community-based organizations. Targeted, sustained prevention efforts are required for young MSM as they come of age and initiate high-risk behaviour. Education on the effects of drug and alcohol use on sexual decision-making must play a role in prevention programs for youth as should STD treatment. Research on the factors contributing to risk behaviour among youth must be conducted. Each of these strategies is critical for the well-being of Canadian youth and also for the development of healthy behaviours among young people that will further enhance their health as adults.

Figure 1. Reported Genital Chlamydia Rates in Canada by Age Group and Sex, 1999

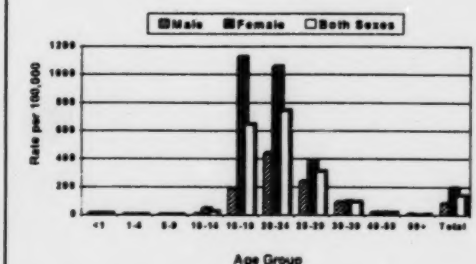
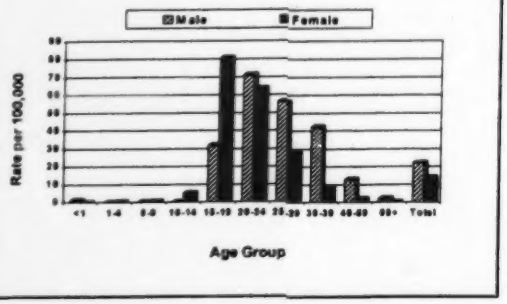


Figure 2: Reported Gonorrhea Rates in Canada by Age Group and Gender, 1999



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For more information, please contact:

Division of HIV/AIDS Epidemiology & Surveillance
Bureau of HIV/AIDS, STD and TB
Centre for Infectious Disease Prevention & Control
Health Canada
Tunney's Pasture, Postal Locator 0900B1
Ottawa, Ontario K1A 0L2

Tel: (613) 954-5169
Fax: (613) 946-8695

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Centre for Infectious Disease Prevention and Control

May 2001

HIV and AIDS Among Women in Canada

At a Glance

- **In Canada, a total of 1,330 AIDS cases and 5,419 HIV cases have been reported in women up to December 31, 2000.**
- **Women represent an increasing proportion of reported HIV cases in Canada, and accounted for 24% of positive HIV test reports in 2000.**
- **Heterosexual contact and injection drug use are the two major risk factors for HIV infection in women.**

Introduction

The HIV/AIDS epidemic in Canada has changed from the early epidemic that affected primarily men who have sex with men (MSM) to the current epidemic which increasingly affects other groups such as injecting drug users (IDU) and heterosexuals. As a result of this shift, HIV/AIDS affects a growing number of women. The HIV/AIDS epidemic among women is of particular concern because of the potential for transmission to their infants. This report updates the status of HIV and AIDS among adult and adolescent women (15 years and older) in Canada.

AIDS

In Canada, of the 17,384 cumulative AIDS cases in adults reported up to December 31, 2000 to the CIDPC, 1,330 (7.7%) were among women. The proportion of AIDS cases among women (relative to all reported AIDS cases in adults for which gender and age are known) has increased over time, from 6.3% in 1991 to 8.5% in 1995 and peaking at nearly 16% in 1998 and 1999. In 2000, women accounted for 10.1% of adult AIDS cases, however the sample size so far for 2000 is small and further data are needed before this apparent decline can be confirmed.

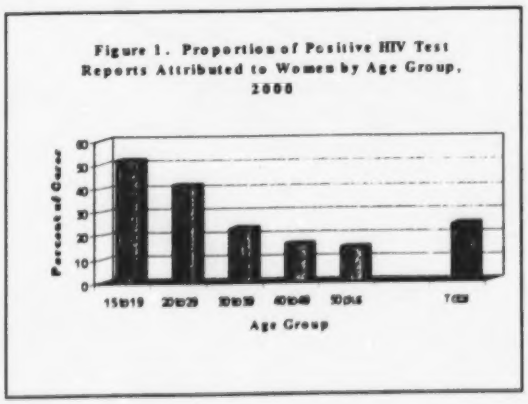
Of all cumulative reported AIDS cases in women, 66.9% are attributed to heterosexual contact, 22.8% to injecting drug use, and 10.1% to recipients of blood and blood products. There has been a steady increase in the proportion of adult female AIDS cases attributed to IDU, from 16.7% prior to 1995 to 23.8% in 1995 and 34.6% in 2000.

HIV

AIDS data can contribute to an understanding of trends in HIV infections, but only on those acquired approximately 10 years in the past. In contrast, positive HIV test reports provide a picture of more recent infections. Data from provincial and territorial HIV testing programs indicate that a total of 5,419 positive HIV tests with known age and gender have been reported in adult women up to December 31, 2000.

Women account for a growing proportion of positive HIV tests reports with known age and

gender among adults in Canada. Before 1995, 9.9% of all positive HIV reports were among women. Between 1995 and 2000, this proportion increased from 18.8% to 23.9%. The proportion of women among positive HIV test varies considerably by age and is highest among adolescents and young adults (Figure 1). In 2000, women accounted for 51.5% and 40.8% of positive HIV test reports among those aged 15 to 19 years and 20 to 24 years, respectively.



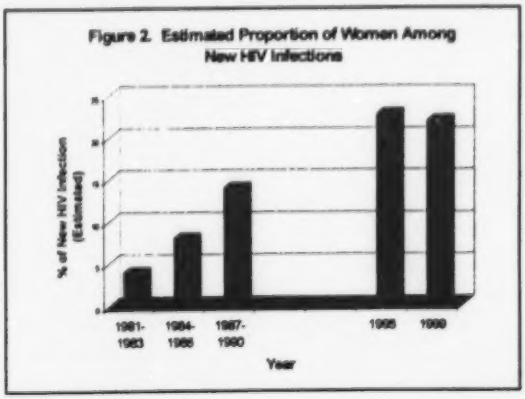
Among women, the primary exposure categories associated with newly diagnosed HIV infection are heterosexual contact and IDU (Table 1). In 2000, heterosexual contact and IDU exposure categories together accounted for 94.4% of newly diagnosed HIV infections among women; this represents an increase from 81.0% for the period before 1995.

Table 1: Proportion of Positive HIV Tests Among Adult Females by Exposure Category and Year of Test, Canada

	Exposure Category		
Year	Hetero-sexual Contact	IDU	Blood & Blood Products
1985-94	49.1	31.9	12.4
1995	35.5	53.6	3.7
1996	43.6	51.0	1.3
1997	45.7	45.0	1.4
1998	52.8	38.5	3.7
1999	48.4	47.5	1.1
2000	55.9	38.5	1.7
TOTAL	47.5	40.2	6.4

HIV Incidence Estimates Suggest Rising Number of New Infections Among Women in Canada

Data from positive HIV test reports do not provide the complete picture of the annual number of new HIV infections since only a proportion of those infected are tested in the same year. Furthermore, not all positive test results are reported. The Bureau of HIV/AIDS, STD & TB estimates the number of HIV infections acquired over a one year period using information from AIDS case reports, provincial HIV testing databases, population-based surveys, targeted epidemiologic studies, and census data. In 1999, approximately 4,190 persons in Canada became newly infected with HIV, with an estimated 920 (21.9%) among women.[1] The estimated proportion of women among new HIV infections has increased since the 1980s.[1] In 1996 and 1999, it was estimated that women accounted for more than one of every five new infections[1] (Figure 2).



These recent estimates also indicate that the number of women in Canada living with HIV, including those with AIDS, continues to grow. By the end of 1999, an estimated 6,800 women were living with HIV, an increase of 48 % from the 1996 estimate of 4,600.[1]

HIV among Pregnant Women and Women of Childbearing Age

HIV testing during pregnancy is an option available to women across Canada. However, physician guidelines and/or recommendations encouraging informed decisions regarding HIV testing during pregnancy vary by province and territory. These are discussed in detail in the *Epi Update* entitled "Perinatal Transmission of HIV", May 2001.

HIV prevalence studies among pregnant women can provide an important source of information on the prevalence rate of HIV in the general heterosexual population. Prenatal seroprevalence studies in Canada report an estimated national rate of HIV infection among pregnant women of 3-4/10,000 population. Provincial rates have ranged from 1.9/10,000 (Ontario 1991-92[2]) to 8.7/10,000 (Newfoundland 1991-93[3]). This high prevalence rate among pregnant women reported in Newfoundland during 1991 to 1993 is believed to reflect an outbreak of HIV infection that occurred during the study period.[4] A follow-up study conducted in the province between 1995 and 1996 reported a significantly lower prevalence estimate of 3.3/10,000, which is similar to the national average.[4]

Large metropolitan areas report higher rates of HIV infection among pregnant women (4.7 for Vancouver versus 3.4 for the rest of B.C. in 1994[5] and 15.3 for Montreal versus 5.2 for the province of Quebec in 1990[6]). Even provinces without large metropolitan areas have indicated significant rates (for example, 4.1/10,000 in New Brunswick for 1994-96[7]). Data from Manitoba suggest an increasing trend of HIV infection among women of childbearing age, from 0.7/10,000 in 1991 to 3.2/10,000 in 1994-95.[8] Studies are ongoing in Ontario and B.C. to update the prevalence estimates of HIV among women of child-bearing age.

Comment

Women in Canada are increasingly becoming infected with HIV, especially injecting drug users and women with high risk sexual partners. Efforts to reduce transmission of HIV will need to focus on promoting safer sexual behaviours and reducing substance abuse.

All women, and especially women of childbearing age, should have access to HIV testing, counselling and care. Better data on the trends, risk factors and geographic shifts of HIV among Canadian women are needed to help target prevention and care programs.

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HIV/AIDS *Epi Update*

Bureau of HIV/AIDS, STD and TB Update Series
Centre for Infectious Disease Prevention and Control

May 2001

Perinatal Transmission of HIV

At a Glance

- **HIV testing during pregnancy and associated anti-retroviral treatment can dramatically reduce the probability of mother-to-child HIV transmission.**
- **Provincial HIV prevalence rate among pregnant women in Canada is approximately 3-4/10,000.**
- **The proportion of pregnant women receiving antiretroviral therapy in Canada increased from 37% in 1994 to 84% in 1998.**
- **In Canada, recommendations have been developed to encourage informed decisions regarding HIV testing during pregnancy. All pregnant women, and women considering pregnancy, should have access to prenatal care that includes the offer of HIV testing as well as appropriate counseling and care.**

Introduction

Perinatal (or vertical) transmission of HIV is the transmission of HIV from an infected pregnant women to her newborn child. Transmission can occur during gestation (in utero), during delivery (when the fetus makes contact with maternal blood and mucosa in the birth canal) or after delivery, through breastmilk. Therefore, women of childbearing age (15-44 years) are of particular concern since they may transmit HIV infection to their newborn children. In this report, the status of perinatal HIV transmission in Canada and of HIV testing recommendations for pregnant women are discussed.

AIDS Case Reports

As of December 2000, 17,594 AIDS cases have been reported to the Centre for Infectious Disease Prevention and Control in Canada, including 1,330 cases (7.6%) among adult women (aged 15 and older). Of these, 1,060 (80%) were among women of childbearing age (15-44 years).

For pediatric AIDS cases (children 0-14 years), 203 cases were reported and 158 of these (78%) were attributed to perinatal transmission.

HIV among Pregnant Women and Women of Childbearing Age

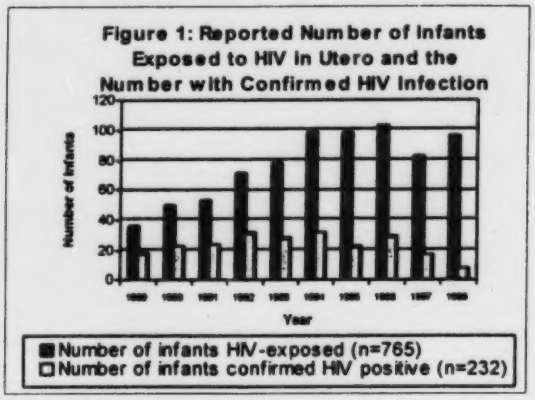
HIV prevalence studies among pregnant women indicate a provincial rate for Canada of about 3-4/10,000, although data for some provinces have not been updated for five or more years. The provincial range is from 1.9/10,000 (Ontario 1991-92[1]) to 8.7/10,000 (Newfoundland 1991-93[2]) and large metropolitan areas have higher rates (4.7 for Vancouver versus 3.4 for the rest of B.C. in 1994[3], and 15.3 for Montreal versus 5.2 for the province of Quebec in 1990[4]). However, even provinces without large metropolitan areas have significant

rates (for example, 4.1/10,000 in New Brunswick for 1994-96[5]) and data from Manitoba suggest an increasing trend of HIV infection among women of child-bearing age (from 0.7/10,000 in 1991 to 3.2/10, 000 in 1994-1995[6]).

Transmission of HIV from Mother to Child

In Ontario, 34 HIV-infected infants were born to HIV-positive mothers during 1984-89, and 59 such infants were born during 1990-97. During 1984-97, just over 58% of the HIV-positive mothers reported their risk factor for HIV as being from an endemic country, where heterosexual transmission of HIV is the most likely mode of transmission.[7]

At the national level, over the past decade, the number of infants born to HIV-infected mothers (HIV-exposed infants) increased steadily until 1994 and has been approximately constant since then (Figure 1)[8]. The figure also depicts the reported number of infants born to HIV positive mothers and the number of infants who, to date, have confirmed HIV infection (data from the Canadian Pediatric AIDS Research Group).



Of the reported total of 765 infants who were exposed to HIV from their mothers between 1989 and 1998, 232 have been confirmed HIV positive and an additional 61 have indeterminate serostatus and are currently being monitored. Of the exposed infants, over the past decade, an increasing proportion had received some treatment during the course of their gestation and/or after birth.

Provincial Prenatal HIV Screening Recommendations

In all Canadian provinces, HIV testing of pregnant women remains the choice of the woman. Guidelines and/or recommendations have been developed to encourage informed decisions in terms of HIV testing during pregnancy.

Newfoundland: In 1997, the Newfoundland and Labrador Advisory Committee on Infectious Diseases recommended that HIV testing be added to the existing prenatal screening program. HIV testing is done as part of the routine prenatal screen, unless the woman declines. The Newfoundland and Labrador Medical Association and the provincial Public Health Laboratory and Department of Health and Community Services have supported this recommendation and have worked to actively notify physicians and patients of this recommendation.[9]

Prince Edward Island: In June 1999, the PEI Department of Health and Social Services formally adopted a policy of supporting HIV testing for all pregnant women and recommends that physicians offer HIV testing at the first prenatal visit.[10]

Nova Scotia: The Reproductive Care Program recommends that HIV testing should be offered to all pregnant women, together with other prenatal tests in the first trimester. Women who decline testing in the first trimester or who are known to engage in high risk activities should be offered testing again during the latter stages of their pregnancy.[11]

New Brunswick: The New Brunswick Medical Society's Subcommittee on Perinatal Health Care recommended, in July 1999, that physicians should routinely encourage all pregnant women to be tested for HIV with appropriate pre- and post-test counseling and informed consent. In addition, nominal and non-nominal HIV testing and counseling are available through physicians and sexual health centres, and anonymous testing is available at sexual health centres.[12]

Quebec: Since 1997, as part of an intervention program on HIV infection and pregnancy, the Ministry of Health and Social Services, in accordance with the College of Physicians, initiated a program recommending that all pregnant women and women contemplating pregnancy be offered an HIV test.[13]

Ontario: On December 1, 1998, the Minister of Health announced that the prenatal screening program would be expanded to include HIV testing. Through this expanded program, all pregnant women are offered an HIV test as part of their prenatal care. The HIV test is performed only after counseling is provided and informed consent is given. Health providers must complete the laboratory requisition to confirm that these two provisions have been met. Laboratory requisitions not meeting these criteria are not processed.[14]

Manitoba: Manitoba Health revised its prenatal HIV testing policy in early 2001. The current policy strongly recommends that all physicians provide appropriate information and testing for HIV to all pregnant women as part of routine prenatal care. The decision to be tested should be voluntary and based on informed choice[15].

Saskatchewan: The College of Physicians issued guidelines for physicians to assess a woman's risk and inform her that testing is available.[16]

Alberta: On September 1, 1998, HIV screening was added to the routine prenatal blood tests for all women in Alberta. HIV screening is done unless the woman declines to be tested. Canadian Blood Services laboratories in Calgary and Edmonton do the initial HIV screening on prenatal blood samples received for blood grouping, Rh determination, anti-erythrocyte antibodies and hepatitis B serology. Repeatedly reactive samples are sent for confirmation testing by the Provincial Public Health Laboratories.[17]

British Columbia: In June 1994, the B.C. Ministry of Health recommended that HIV testing be offered as a routine prenatal component, with informed consent and pre- and post-test counseling.[18]

Northwest Territories (NWT): In 1993, the Northwest Territories Maternal and Perinatal Committee, which has representation from the Department of Health and Social Services and the Northwest Territories Medical Association, recommended that all pregnant women be tested for HIV. In 1998, screening for HIV became fully integrated with routine prenatal care, although women are provided the opportunity to opt out.[19]

Nunavut (new territory separated from the NWT in 1999): same policy as in NWT.[20]

Yukon: In 1994, the Chief Medical Officer of Health, in conjunction with Yukon Communicable Disease Control, "strongly recommended" testing of all pregnant women. Women who present for testing are also encouraged to recommend their partner be tested as well.[21]

Canadian Women Can Access Prenatal HIV Screening Programmes

Data from prenatal HIV screening programs can provide important information on the effectiveness of prenatal HIV screening recommendations. Below are data from several provinces:

Alberta: During the first year of their program, 4% of a total of 51,500 eligible pregnancies declined testing. These data have found 15 HIV-positive women, for a rate of 2.91/10,000. In the following year, 2.4% of pregnant women declined testing and the HIV prevalence rate was 3.47/10,000.[17]

Quebec: Before the initiation of their prenatal HIV screening program in July 1997, it was estimated that about 45% of women were tested during pregnancy. From May 1997 to January 1998, testing rates increased to about 75%. Between July 1997 and May 1998, 15 pregnant women were identified as HIV-positive.[22]

Manitoba: By comparing laboratory requisitions for HIV serology and requisitions for routine prenatal tests, the provincial public health laboratory estimates that the proportion of women tested for HIV during pregnancy has increased dramatically in

recent years, from about 10% of pregnant women screened for HIV in 1996, to 37% in 1997 and to about 60% since 1999.[23]

British Columbia: About 55% of pregnant women were tested for HIV in 1995; this proportion was estimated to be up to 80% in 1999 (60% through routine prenatal testing and 20% through groups identified as high risk).[18]

Ontario: An estimated 51% of prenatal specimens were tested for HIV during 1999-2000. Rates of HIV testing were higher in Ottawa-Carleton (61.0%) and in Eastern/ Northern Ontario (57.7%) than in Toronto (48.9%).[24]

Newfoundland: Almost all pregnancies in 2000 (estimated to be 9,000) were tested for HIV and no HIV-positive results were found.[9]

Antiretroviral Treatment Can Reduce the Likelihood of Transmission of HIV from Mother to Infant During Pregnancy

HIV testing during pregnancy can provide the opportunity to offer antiretroviral treatment to the mother and infant. For example, a full AZT protocol, which includes administering AZT to the mother during the second or third trimester, during labour and delivery, and after delivery to the infant for 6 weeks can reduce the likelihood of transmission of HIV from mother to newborn by about 2/3.[25] Clinical trials in developing countries have recently shown that short course AZT regimes (given to pregnant women starting at 36 weeks gestation and during labour) can reduce vertical transmission rates by about 50%.[26] Recent studies indicate that even greater reductions can be achieved using single-dose nevirapine.[27]

In Quebec, at Sainte-Justine Pediatric Hospital, the use of antiretroviral therapy (AZT) reduced the likelihood of mother-to-infant HIV transmission from 28.3% transmission among mother-infant pairs who had not received any AZT, to 3.75% for mother-infant pairs who had received partial or full AZT therapy.[28] Similarly, a more recent study (1993-99) on AZT use in B.C found a reduction in the HIV vertical transmission rate from 28% in untreated women-infant pairs to 13% in partially-treated pairs and 0% in completely-treated pairs.[29]

Data from the national surveillance program of Pediatric Centres and HIV clinics in Canada (where 95% of the diagnosed HIV-exposed infants are followed) indicate that the proportion of pregnant women receiving antiretroviral therapy has increased steadily in the last five years, from 37% in 1994 to 53-58% in 1995-96, 72% in 1997 and 84% in 1998. The resulting perinatal HIV transmission rate was reduced to 4.8% with AZT monotherapy and to 2.5% with combined therapy.[30]

Canadian Prenatal HIV Screening Programs Are Valuable

Screening pregnant women for HIV clearly represents an important opportunity to prevent the transmission of HIV to infants. From the perspective of a cost-benefit analysis (which includes the costs of screening tests, counseling and treatment), the benefit of screening is obviously greater in areas with higher HIV prevalence among child-bearing women. For areas of lower HIV prevalence, the benefit per unit cost is more dependent on variables such as whether or not physicians bill separately for the counseling time associated with prenatal HIV testing.[31] It is estimated that if such programs screened 90% of pregnant women across Canada, there would be a 65% reduction in the number of HIV-infected newborns (compared to no prenatal testing and assuming 24% of untreated pregnancies and 6% of treated pregnancies result in HIV-infected infants).[32] Assuming HIV prevalence rates of 6/10,000 among pregnant women in BC, Ontario and Quebec and 3/10,000 elsewhere, this reduction in absolute number terms would be from 56 to 20 infected newborns, or 36 infections prevented annually.

Comment

There is still a risk for the perinatal transmission of HIV in Canada and as more women are becoming infected, this risk is increasing. Elsewhere, we have

estimated that about 15,000 Canadians (including women) are HIV-infected, but unaware of their infection (see *Epi Update* entitled "Prevalent HIV Infections in Canada: Up to One-Third May Not Be Diagnosed", May 2001). Given this, and the fact that perinatal infections are preventable, it is important that all pregnant women, and women considering pregnancy, should have access to prenatal care that includes the offer of HIV testing as well as appropriate counseling and care.

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For more information, please contact:

Division of HIV/AIDS Epidemiology & Surveillance
Bureau of HIV/AIDS, STD and TB
Centre for Infectious Disease Prevention & Control
Health Canada
Tunney's Pasture, Postal Locator 0900B1
Ottawa, Ontario K1A 0L2

Tel: (613) 954-5169
Fax: (613) 946-8695

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AIDS/HIV Ethnicity in Canada

At a Glance

- **In 2000, the reporting completeness of ethnicity information was 83.5% in reported AIDS cases and 24.9% in positive HIV test reports.**
- **Whites comprise the largest proportion of reported AIDS cases (74.8%) and positive HIV tests (64.2%) in 2000, and Aboriginal persons are next at 9.2% and 17.7%, respectively.**
- **Among positive HIV test reports in 1998-2000, the most common exposure category for Blacks was heterosexual and for Aboriginal persons was injecting drug use; both groups had nearly equal numbers by gender.**

Introduction

Documentation of ethnicity among reported AIDS cases and positive HIV test reports has become an important component of AIDS and HIV surveillance due to the unique perspective it offers on the epidemic. As with other demographic identifiers, ethnicity information can contribute to the creation and evaluation of targeted prevention and treatment programs as well as to the development of health policy.

This *Epi Update* presents a summary of ethnicity information from the national AIDS and HIV surveillance system. Additional information is available in "HIV and AIDS in Canada: Surveillance Report to December 31, 2000".[1]

AIDS

Improved Ethnicity Reporting Among AIDS Cases

Since 1982, when the first AIDS case was reported in Canada, a total of 83.9% (14,765/17,594) of AIDS case reports have included ethnicity. During this time, the proportion of cases with this information has improved. Between 1982 and 1991, 77.5% of reported AIDS cases indicated ethnicity. In the last ten years, this figure increased to 87.4%. Reporting on ethnicity peaked in 1998 at 93.3%, but has since declined to 83.5% in 2000.

Reported AIDS Cases and Ethnicity: A Balance of Changing Proportions

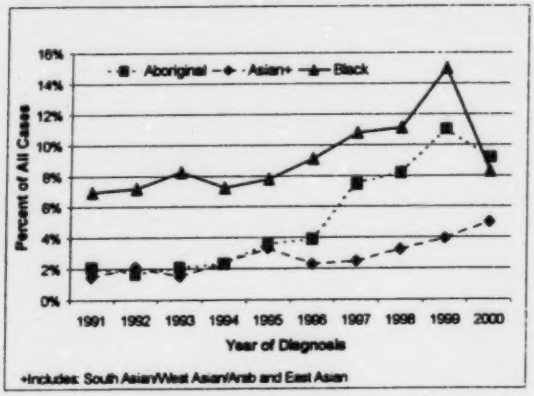
The total number of reported AIDS cases has declined over the last ten years from 1,556 cases in 1991 to 261 in 2000. The number of cases in some ethnic groups, however, has not declined at the same rate as others. In order to better understand trends by ethnic status, it is helpful to examine the proportion of all reported AIDS cases attributed to a particular ethnic group.

Whites have historically represented the largest proportion of reported AIDS cases, yet this proportion has declined over the last ten years. In 1991, the proportion of reported AIDS cases among Whites was 88.6% and in 1995, 83.0%. In 1999, the proportion of cases with known ethnicity dipped to 66.1% among Whites, but has since increased to

74.8% in 2000.

With a decrease among Whites, there has been a corresponding increase in the proportion of reported AIDS cases among other ethnic groups. The increase has been most notable among Aboriginal persons and the Black population since 1994 (Figure 1). In 2000, however, there was a decrease in the proportion of these two groups compared to 1999.

Figure 1: Proportion of Reported AIDS Cases for Selected Ethnic Groups, 1991-2000



AIDS surveillance data will be closely monitored in the coming months to determine if the decrease among these populations is a genuine emerging trend. At present, these data must be interpreted with caution due to limitations such as small numbers, reporting delay and under reporting.

In 1996, Aboriginal persons and Blacks comprised 2.8% and 2.0% of Canada's population respectively.[2] In 2000, they accounted for 9.2 % and 8.3% of reported AIDS cases, respectively. Assuming the ethnic composition of Canada's population has remained stable since 1996, this indicates that both Aboriginal persons and Blacks are over-represented in reported AIDS cases in 2000.

It is also interesting to note in Figure 1 that the proportion of reported AIDS cases among the Asian population has been steadily increasing since 1996, although still low at 5% in 2000.

HIV

Missing Pieces: Positive HIV Tests Often Reported Without Ethnicity Information

Ethnicity reporting for positive HIV test reports is not as complete as that of reported AIDS cases because ethnicity data is available only for some provinces and territories. Reporting of HIV is more recent than AIDS and there is still some concern regarding documentation of confidential information. As a result, the analysis of ethnicity information for HIV test reports presents a challenge.

Ethnicity data for positive HIV test reports have only been available since 1998, and therefore comparisons are possible only for this limited period of time. The proportion of positive HIV test reports with ethnicity information was 25.4% in 1998, 28.9% in 1999, and 25.0% in 2000.

When examining HIV data, it must also be considered that the source of many HIV reports which include ethnicity are from areas where the Aboriginal population is high in comparison with other parts of Canada. Provinces and territories that report ethnic information include British Columbia, Yukon Territory, Alberta, Saskatchewan, Manitoba, PEI and Newfoundland. HIV ethnicity data is not available for the remaining provinces and territories. As a result, the ethnicity data for HIV test reports should be viewed as preliminary.

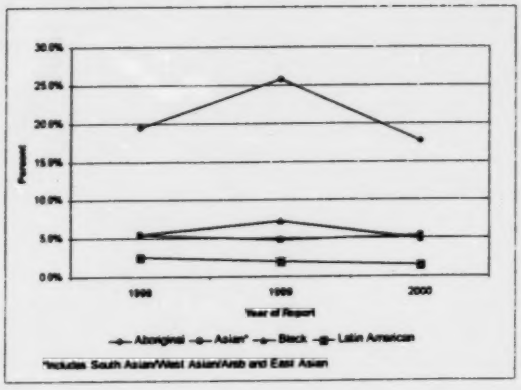
Aboriginal Persons Constitute A Notable Proportion of Positive HIV Tests With Known Ethnicity

The majority of positive HIV test reports with ethnicity information are among Whites, similar to the situation seen in reported AIDS cases. Whites represented 66.7%, 59.2% and 64.2% of positive HIV reports with known ethnicity in 1998, 1999 and 2000, respectively.

In 1998, 19.5% of positive HIV tests with known ethnicity were among Aboriginal persons as compared to 25.8% in 1999 and 17.7% in 2000

(Figure 2). These proportions are much higher than the 9.3% that Aboriginal persons comprise of reported AIDS cases during the same period. This is likely due in part to the HIV ethnicity information being primarily from western provinces where the Aboriginal population is greater. For additional information on HIV/AIDS among Aboriginal people, refer to the *Epi Update* entitled "HIV/AIDS Among Aboriginal Persons in Canada Remains a Pressing Issue", May 2001.[3]

Figure 2: Proportion of Positive HIV Tests with Known Ethnicity in Selected Ethnic Groups, 1998-2000.



Compared to other non-White ethnic groups, Aboriginal persons account for a higher proportion of positive HIV test reports where ethnicity has been recorded (Figure 2).

Positive HIV Tests Reflect Differences Among Ethnic Groups

Table 2 shows the distribution of gender, age and exposure category among positive HIV test reports for different ethnic groups. Such information may be of assistance in the design and targeting of prevention and care programs.

Table 2: Comparison of Positive HIV Test Reports Between Selected Ethnic Groups, 1998-2000

	White	Aboriginal	Black
Gender	**n = 1103**	**n = 371**	**n = 103**
Male	82.4%	53.4%	55.3%
Female	17.6%	46.6%	44.7%
Age (Years)	**n = 1111**	**n = 369**	**n = 105**
20-29	17.6%	33.3%	33.3%
30-39	41.4%	39.6%	38.1%
40-49	27.3%	17.6%	17.1%
Exposure Category	**n = 1053**	**n = 365**	**n = 99**
MSM	35.7%	9.9%	12.1%
IDU	37.8%	59.5%	9.1%
HET	21.6%	25.8%	74.7%

MSM = Men who have sex with men; IDU = Injecting Drug Use; HET = Heterosexual Risk (Pattern II country, Sexual contact, No Identified Risk Heterosexual). Subtotals differ due to unknown gender, age and exposure in some reports. Provinces with ethnicity reported include BC, YK, AB, SK, MB, PEI, NFLD).

Available evidence suggests that among Aboriginal persons and the Black population, positive HIV test reports are equally distributed between males and females and a higher proportion are infected at a younger age. In contrast, there is a higher proportion of positive test reports among White males than White females (82.4% vs. 17.6% respectively).

As shown in Table 2, injecting drug use has been a key mode of transmission among Aboriginal persons, comprising 59.5% of reports during 1998-2000. Among Whites, the highest proportion of positive HIV test reports was attributed to injecting drug use (37.8%) and men who have sex with men (35.7%). Heterosexual exposure represented the largest proportion of positive HIV test reports among the Black population (74.7%). The majority

of these are categorized to the subgroup indicating origin in a country where heterosexual transmission of HIV predominates.

Limitations of Ethnicity Data from Reported HIV and AIDS Cases

There are several significant limitations regarding the accuracy of ethnicity data obtained from AIDS and HIV surveillance information. The following should be reviewed when examining such data:

Misclassifications of ethnic status may occur at the time of HIV or AIDS diagnosis.

- Patients in certain communities may not wish to identify their ethnicity, resulting in under-representation.
- For AIDS reporting, patients and physicians are constrained by the list of ethnic categories available on the AIDS Case Report Form which may compromise accurate reporting.
- Not all provinces and territories routinely collect and/or report ethnicity status.
- Variations in the completeness of ethnicity reporting between and within provinces may result in a systematic over- or under-representation of specific communities.
- Reporting delay may vary by ethnicity, and may therefore affect the representativeness of ethnicity data for recently reported HIV and AIDS cases.

Given these limitations, caution should be exercised in interpreting the AIDS and HIV ethnicity data presented. This is particularly true of positive HIV test reports for which there is less complete ethnicity information.

Comment

Ethnicity data on HIV/AIDS may be used by community health groups and public health officials to more effectively plan prevention and care programs for the different ethnic communities. When combined with other epidemiologic descriptors of the HIV/AIDS epidemic, such as gender, age group, and exposure category, such information becomes a powerful tool for directing programs to where they will have the most impact. To increase our ability to do this, it is essential that the completeness and accuracy of ethnicity reporting be improved.

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HIV/AIDS Among Aboriginal Persons in Canada Remains a Pressing Issue

At a Glance

- **In Canada, 410 AIDS cases and 497 positive HIV tests have been reported among Aboriginal persons up to December 31, 2000.**
- **The proportion of Aboriginal AIDS cases, after adjusting for reporting delay, increased from 1% before 1990 to 10.8% in 1999 and 8.5% in 2000.**
- **The proportions of Aboriginal HIV and AIDS cases that are <30 years old, female, or attributed to injecting drug use are greater than the corresponding proportions among non-Aboriginal cases.**
- **In 1999, an estimated 370 Aboriginal persons in Canada were newly infected with HIV; at the end of 1999, an estimated 2,740 Aboriginal persons were living with HIV.**

Introduction

In Canada, the Aboriginal populations are very diverse with many sub-groups (First Nations, Inuit and Metis) that reflect variations in historical backgrounds, language and cultural traditions. These groups represent 2.8% of the Canadian population.[1] However, they are disproportionately affected by many social, economic and behavioral factors (such as high rates of poverty, substance abuse, sexually transmitted diseases, limited access to or use of health care services) which increase their vulnerability to HIV infection. Hence, in recent years, an increase in the HIV/AIDS epidemic has been observed in some Aboriginal communities, particularly those in inner-cities. This report updates current information on the status of the HIV/AIDS epidemic among Aboriginal persons in Canada.

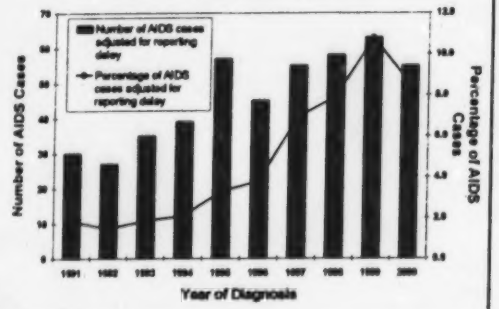
Pattern of AIDS is Different among Aboriginal Persons

Increasing Trend Over Time:

- As of December 31 2000, there have been 17,594 AIDS cases reported to the Centre for Infectious Disease Prevention and Control (CIDPC) in Canada [2]. Of that total, 410 were reported as Aboriginal persons (16 Inuit, 31 Metis, 331 Native Indians (i.e. First Nations), and 32 Aboriginal unspecified).

- After adjusting for reporting delay, the annual number of AIDS cases has increased more-or-less steadily since the early 1990s (Figure 1). This trend contrasts with the trend in the overall number of delay-adjusted AIDS cases which declined for most of the 1990s (see HIV and AIDS in Canada: Surveillance Report to December 31, 2000).[2] The annual proportion of AIDS cases attributed to Aboriginal persons increased from 1% before 1990 to 10.8% in 1999 and 8.5% in 2000 (Figure 1).

Figure 1: Annual Number and Percentage of Aboriginal AIDS Case Reports, Canada, 1991-2000


Number of AIDS cases adjusted for reporting delay
Percentage of AIDS cases adjusted for reporting delay
Number of AIDS Cases
Percentage of AIDS Cases
Year of Diagnosis

Injecting Drug Use - A Major Risk Factor

- There have been 316 Aboriginal males with a reported AIDS diagnosis. Of those with known exposure, 49.4% were men who have sex with men (MSM), 26.1% were injecting drug users (IDU), 12.9 were MSM/IDU, 9.4% were at risk through heterosexual contact, 0.6% had received blood/clotting factors and 1.6% were infected though perinatal transmission.

- There were 93 Aboriginal women with a reported AIDS diagnosis up to December 31, 2000. Among those with known exposure, 64.7% were IDU, 30.7% heterosexual contact, 2.3% had received blood/clotting factors, 2.3% perinatal transmission.

- The proportion of reported Aboriginal AIDS cases attributed to IDU has dramatically increased over time, from 2% prior to 1991 to 15% during 1991-1995 and 34% during 1996-2000.[2]

As shown in Table 1, the proportion of females and the proportion less than 30 years old among reported Aboriginal AIDS cases, are higher than among non-Aboriginal AIDS cases. Also, there is a higher proportion of Aboriginal AIDS cases that have IDU as an exposure category compared to non-Aboriginal cases (34.3% vs 5.9%).[2]

Table 1: Gender, Age and Injecting Drug Use among Aboriginal and Non-Aboriginal Reported AIDS Cases up to December 31, 2000

	Aboriginal	Non-Aboriginal
Female	22.7%	7.9%
<30 years old	25.9%	16.7%
IDU exposure category	34.3%	5.9%

HIV Data

- While AIDS data provide information on HIV infections that occurred about 10 years in the past, HIV data provide a picture of more recent infections.

- Positive HIV reports from provinces with ethnicity reporting (British Columbia, Yukon, Alberta, Saskatchewan, Manitoba, Newfoundland and Prince Edward Island) indicate that Aboriginal persons were over-represented among new HIV diagnoses, i.e. 19.5% in 1998, 25.8% in 1999, and 17.7% in 2000. Comparisons between Aboriginal and non-Aboriginal persons with respect to gender, age and exposure categories within positive HIV tests reported from 1998-2000 show similar patterns to reported AIDS cases (see Table 2). Reported positive HIV tests among Aboriginal persons have a higher proportion of females than do non-Aboriginal persons. They also have a higher proportion in the age group 20-29 years and a higher proportion attributed to IDU.[2]

Table 2: Gender, Age and Exposure Categories among Reported HIV Tests, Aboriginal vs Non-Aboriginal Persons in Provinces with Reported Ethnicity, 1998-2000**

	Aboriginal	Non-Aboriginal
Gender	**n = 371**	**n = 1,373**
Male	53.4%	80.3%
Female	46.6%	19.7%
Age (years)	**n = 369**	**n = 1,382**
20-29	33.3%	19.5%
30-39	39.6%	41.0%
Exposure Category	**n = 365**	**n = 1,299**
MSM	9.9%	33.9%
IDU	59.5%	33.6%
Heterosexual	25.8%	27.8%

** BC, YK, AB, MB, SK, PEI, NFLD

Aboriginal Women and Children

- Infected pregnant women are at risk for transmitting HIV to their unborn child. Recent data from some sites in western Canada have shown that a high proportion of HIV-infected pregnant women who deliver are Aboriginal. Among all pediatric centres across Canada where children and HIV-infected mothers were followed between 1995-1997, 19% (n=259) were Aboriginal women.[3] Of 32 HIV-infected women who delivered in Northern Alberta or the NWT in 1996-98, 29 (91%) were Aboriginal.[4]

- Despite high numbers of Aboriginal women seen at HIV clinic and pediatric centres, there is encouraging news that pregnant Aboriginal women (62%) were as likely to be on antiretroviral therapy as pregnant Caucasian women (66%) and pregnant Black women (63%).[5]

Aboriginal Men who Have Sex with Men

- A study done among MSM in Winnipeg in 1995 found that 17% were Aboriginals.[6]

- The proportion of Aboriginal participants was 41% in a recent cross-Canada study (1999-2000) among male street youth who reported having sex only with men.[7]

- In an ongoing study (1996-present) among young MSM in Vancouver, 8% of participants were Aboriginal men. These Aboriginal MSM were more likely than non-Aboriginal MSM to be unemployed, to live in unstable housing, to have higher depression scores, to report non-consensual sex or sexual abuse during their childhood, and to be involved in the sex trade.[8]

Aboriginal Inmates

- Across Canada, 14% of federal inmates are Aboriginal persons, with rates up to 40% in provincial or federal jails in some provinces.[9-11]

Increasing Proportion of Aboriginal Persons among Estimated HIV Prevalent and Incident Infections at the National Level

- According to the latest estimates of HIV prevalence and incidence produced by the Bureau of HIV/AIDS, STD and TB, the number of Aboriginal persons living with HIV has increased from 1,430 in 1996 to 2,740 in 1999 (91% increase during the three year period).[12] The estimated number of incident infections among Aboriginal persons increased from 310 in 1996 to 370 in 1999. Although Aboriginal persons comprise only 2.8% of the general Canadian population, they accounted for 5.5% (2,740/49,800) of all prevalent infections and 8.8% (370/4,190) of all new infections in Canada in 1999. The estimated exposure category distribution of prevalent and incident infections among Aboriginal persons in 1999 is shown in Table 3.[12]

Table 3 Estimated Exposure Category Distribution among prevalent and incident HIV infections among Aboriginals in Canada, 1999.

Exposure category	Prevalent infections (n=2,740)	Incident infections (n=370)
IDU	54%	64%
Heterosexual contact	15%	17%
MSM	23%	11%
MSM/IDU	6%	8%

Comment

Aboriginal HIV and AIDS data are incomplete for several reasons. The major reason is the incomplete ethnic information in current surveillance data; in 2000, 75% of positive HIV test reports and 16% of reported AIDS cases had no ethnic information. Other reasons include inter-provincial variations in reporting ethnicity, misclassification of ethnic status, and delays in reporting.

With respect to positive HIV test reports among Aboriginal persons, they only represent those infected individuals who came forward for testing and are subsequently reported. Therefore, the numbers do not represent the total number of Aboriginal persons infected with HIV.

Despite these limitations, available evidence suggests that Aboriginal persons are infected at a younger age than non-Aboriginal persons, that injecting drug use is the most important mode of transmission, and that the HIV epidemic among the Aboriginal community shows no sign of abating. Furthermore, the mobility of Aboriginal persons between inner cities and rural areas may bring the risk of HIV to even the most remote Aboriginal community. Better data on HIV/AIDS epidemiology and HIV testing among Aboriginal persons in Canada are needed to guide prevention and control strategies.

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HIV/AIDS *Epi Update*

Bureau of HIV/AIDS, STD and TB Update Series
Centre for Infectious Disease Prevention and Control

May 2001

HIV Infections Increasing Among MSM In Canada

At a Glance

- **In Canada, MSM have accounted for 78.3% of AIDS cases and 72.2% of positive HIV test reports among adult males up to December 31, 2000.**
- **An increase in rates of new HIV infection among MSM has been observed in some cities (Toronto, Vancouver), from about 1% per year during 1996-98 to 3% in 1999-2000.**
- **From 1996 to 1999, the estimated number of annual HIV infections among MSM in Canada increased from 1,240 to 1,610.**

Introduction

In Canada, the HIV/AIDS epidemic has had a tremendous impact on men who have sex with men (MSM). Even though the toll of the epidemic no longer affects them to the same extent that it did in the early-to-mid 1980s, this group still accounts for the largest number of HIV and AIDS case reports. Recent data on HIV incidence and risk behaviors suggest that MSM continue to be at risk for HIV infection and other sexually transmitted diseases (STDs). This report updates the current information on the status of HIV and AIDS among MSM in Canada.

AIDS Data

- As of December 2000, the Bureau of HIV/AIDS, STD and TB reported a cumulative total of 17,594 AIDS cases. Of the 16,054 adult male AIDS case, 78.3% were attributed to MSM and an additional 5.2% were attributed to the combined group MSM and injecting drug use (MSM/IDU).[1]
- Figure 1 shows a decrease in the proportion of AIDS cases attributed to MSM from 1987-88 until 1999, and then an increase in 2000. The annual number of MSM AIDS cases, adjusted for reporting delay, peaked in 1992-94, decreased sharply during 1995-97, and then began to level off in 1998-99 (delay-adjusted MSM data not available for 2000). This

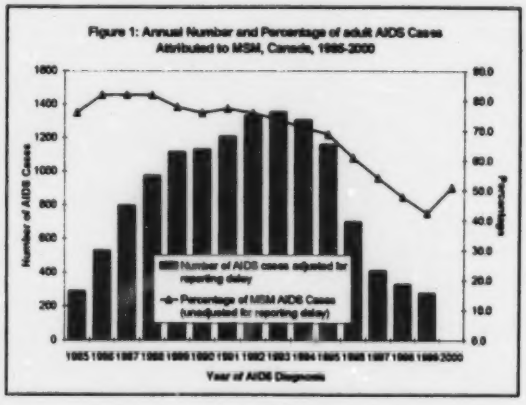


Figure 1: Annual Number and Percentage of adult AIDS Cases Attributed to MSM, Canada, 1985-2000
Number of AIDS Cases
Percentage
Year of AIDS Diagnosis

decrease is likely due in part to the availability of effective treatments for HIV. MSM/IDU

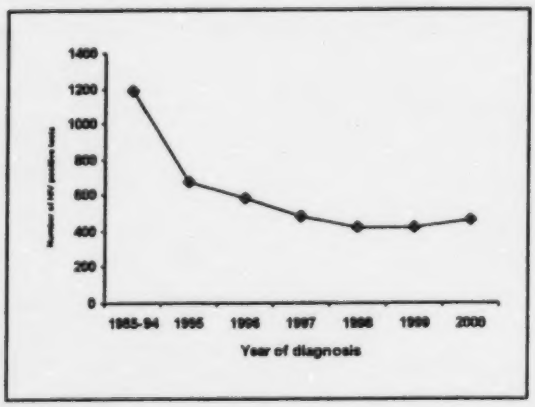
increased from 5.0% of AIDS cases before 1995 to 6.5% in 1999.[1]

HIV Surveillance Data

- While AIDS data provide information on HIV infection that occurred about 10 years in the past, HIV data provide a picture of more recent infections.

- Data from provincial HIV testing programs, collated and synthesized at the national level by the Bureau of HIV/AIDS, STD and TB, showed that prior to 1995, 81% of positive test reports among adult males were attributed to MSM. This proportion dropped steadily to level off at 47% in 1998 and 49% in 1999, and then increased to 54% in 2000. Figure 2 shows a similar trend in the absolute number of positive HIV test reports attributed to MSM: a steady decline to 420 reports in 1999 and then an increase to 463 in 2000. This is the first time an increase has been seen among MSM test reports in the HIV surveillance data since the 1980s.[1]

Figure 2-Annual number of positive test reports attributed to MSM, Canada, 1995-2000



Increasing rate of new HIV infections

- Data from Ontario show a recent increase in the rate of new HIV infections among MSM who are repeat testers for HIV, from 0.86 infections per 100 person-years in 1996 to 1.18 during 1997-98 and 2.56 in 1999. The rate was particularly high in Toronto (3.5 in 1999).[2] A similarly high rate of HIV infections among MSM was found in another study based on a different method. Using a new laboratory technique to identify recent infections among those newly diagnosed for HIV during 1999-2000, Remis and colleagues calculated an incidence rate of 2.7 for Ontario MSM during this period.[3]

- Two ongoing cohort studies among MSM provide information on populations outside Ontario. During 1996-2000, the incidence rate in the Montreal cohort remained at 0.8 in Montreal.[4] However, the rate in Vancouver has increased from 1.0 or less each year during 1995-99 to 3.1 during 2000.[4-6]

- With respect to HIV prevalence, data (self-reported or tested) from surveys done directly among MSM showed a very high rate before 1990 (23-32% in Vancouver;[7-8] 27-57% in Toronto;[7,9] 20-25% in Montreal;[7,10] and between 10-20% in other regions of Canada.[7]) In 1998/2000, it appeared that there has been some decline in self-reported HIV prevalence rate among MSM surveyed by similar methods (e.g. 16% in Vancouver,[11] 10-15% in Montreal).[12-13] However, we still observe a high prevalence rate among MSM who are also injection drug users, for example, 23-28% among MSM/IDU attending needle exchange programs in Ontario (1991-94)[14] and 14-22% among those in Quebec (1995-2000).[15-16]

Continuing Risk Behavior Among MSM

Recent data on risk behaviors suggest that MSM continue to be at considerable risk for HIV infection and other STDs by engaging in unprotected anal intercourse (receptive or insertive UAI) with casual or regular partners, or practicing unsafe sex (oral or anal) with a known HIV positive partner:

- 18% of participants in the Montreal cohort of MSM reported engaging in UAI in the six previous months with any partner except regular partners who are HIV- negative.[17] In another survey in Montreal, the prevalence of reported UAI was 12% among MSM recruited in bars or saunas, but was up to 21-24% among MSM who were HIV-positive.[12-13] About 4% of the 500 surveyed men reported having consensual unprotected anal sex with an HIV-positive male partner.[13]

- In the Vancouver cohort of MSM, the proportion of participants who reported UAI within the last six months increased from 32% in 1998 to 72% in 1999 (with regular partners) and from 15% to 47% (with casual partners).[6]

- With respect to relapse to risky behaviors, available data indicate that 10% of the Montreal cohort and 26-30% of the Vancouver cohort who reported safe sex at baseline disclosed relapse to unprotected anal sex at follow-up six to twelve months later.[4-5]

- STD data may be used as a marker for unsafe sexual behavior. Preliminary data for 1999-2000 show increased reports of rectal gonorrhea among adult males in Toronto and Ottawa compared to earlier years, and a potential outbreak of syphilis among MSM in Calgary.[18] These data suggest increases in unprotected sexual encounters among MSM that corroborate the increases in estimated HIV incidence.

Comment

A number of biases must be taken into account when interpreting the results noted above. HIV diagnostic data are limited to persons who present themselves for testing and so trends in these numbers may be influenced by testing patterns or improved ability to remove duplicate tests. In addition, identifying information that accompanies HIV testing data is sometimes incomplete or inaccurate, and this may limit the usefulness of HIV incidence estimates derived from repeat-tester data.

Results of cohort studies are limited by selection biases, loss to follow-up, and problems with generalizability.

Despite these limitations, available data suggest that there is an increase in HIV infections among MSM in 1999-2000 compared to immediately preceding years, at least in some parts of Canada. In fact, the Bureau has recently estimated that annual HIV infections among MSM in Canada have increased from about 1,240 in 1996 to 1,610 in 1999 (see Epi Update entitled "National HIV Prevalence and Incidence Estimates for 1999: No Evidence of a Decline in Overall Incidence", May 2001).

Similar data indicating increasing infections among MSM, or the potential for an increase, have been noted elsewhere. For example, increases have been seen in HIV incidence among MSM in San Francisco,[19] and in HIV-associated risk behaviours and/or STDs among MSM in the USA,[20-22] Amsterdam,[23] and Sydney, Australia.[24]

Several hypotheses might explain these increases in HIV infections and associated risk behaviours, including: feelings of complacency or optimism related to the success of antiretroviral therapy,[23] false reassurance upon learning an HIV-negative result, a lack of direct experience of the AIDS epidemic among the younger generation of gay men, and a desire to escape the rigorous norms and standards required for a lifetime of safe sex[2,25-26].

Taken together, the recent findings indicate that HIV infections are increasing among MSM in some parts of Canada. They highlight the need to monitor the HIV situation closely, to combat other STDs and to sustain prevention efforts for MSM. In addition, prevention services much reach both infected and non-infected MSM to help them protect their own health and prevent transmission to others.

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For more information, please contact:

Division of HIV/AIDS Epidemiology & Surveillance
Bureau of HIV/AIDS, STD and TB
Centre for Infectious Disease Prevention & Control
Health Canada
Tunney's Pasture, Postal Locator 0900B1
Ottawa, Ontario K1A 0L2

Tel: (613) 954-5169
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HIV/AIDS Among Injecting Drug Users in Canada

At a Glance

- **The proportion of reported AIDS cases attributed to IDU has increased from 8.3% in 1995 to 21.7% in 2000.**
- **From 1996 to 1999, the estimated number of annual HIV infections among IDU in Canada decreased from 1,970 to 1,430.**
- **Despite a slite drop in national HIV infections among IDU, the absolute number of infections in this group is still unacceptably high.**

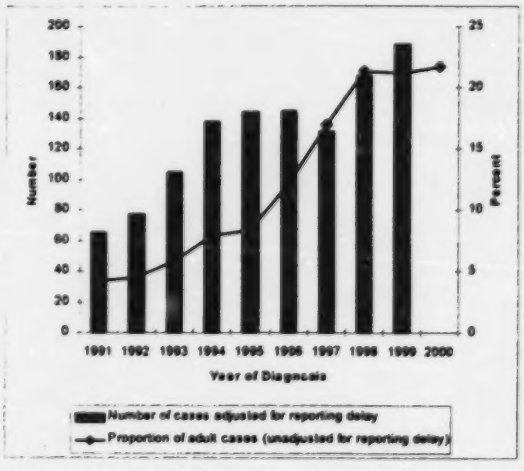
Introduction

The Canadian HIV epidemic in the early 1980s was concentrated among men who have sex with men (MSM). In the early-to-mid 1990's, there was a change toward increasing transmission among injecting drug users (IDUs) such that in 1996, approximately 1,970 of the estimated 4,200 new HIV infections that occurred that year in Canada were among IDUs.[1] Although the national HIV estimates for 1999 show a slight drop in the number of new infections among IDUs (1,430 of a total of 4,190[2]), HIV and AIDS among IDUs in Canada remains a major problem. This report updates information on the status of the HIV/AIDS epidemic among IDUs in Canada.

Injecting Drug Use Remains a Significant Risk Factor Among AIDS Cases

- As of December 31, 2000, 17,594 AIDS cases had been reported to the Centre for Infectious Disease Prevention and Control.[3] Of these, 1,085 have been attributed to IDU and 802 to MSM/IDU.
- Figure 1 shows a steady increase over time in the proportion of adult AIDS cases attributed to IDU, reaching a peak of just over 21% in 1997-2000. The annual number of IDU AIDS cases, adjusted for reporting delay, has also increased over time and peaked at about 190 cases in 1999 (delay-adjusted IDU data not available for 2000).

Figure 1: Reported annual AIDS cases among IDU: number of cases and as a percentage of all AIDS cases



- During the period 1991-2000, the proportion of adult female AIDS cases attributed to IDU increased steadily from 19.4% in 1991 to a peak of 44.9% in 1998, after which the proportion declined slightly to 33.9% in 1999 and 34.6% in 2000. The proportion of adult male AIDS cases attributed to IDU, over the period 1991-2000, steadily increased from 3.2% in 1991 to a peak of 19.8% in 2000. The proportion of adult male AIDS cases attributed to MSM/IDU varied between 4-7% during 1991-99, and was 3.7% in 2000.

A Slight Decline in the Proportion of HIV Positive Test Reports Among IDUs

- Of the 23,771 positive HIV tests reported among adults since 1985, with exposure category information, 15.8% were attributable to IDU. An additional 2.3% were attributed to the combined category of MSM/IDU.

- The proportion of adult positive HIV test reports attributed to IDU prior to 1995 was 8.9%. This proportion increased substantially to 29.5% in 1995, peaked at just over 33% in 1996 and 1997, and then decreased slightly to 28.6% in 1998, 28.5% in 1998, and 26.0% in 1999.

- The proportion of IDU among adult female positive test reports was 38.5% in 2000; the corresponding figure among adult male test reports was 22.4%.

- Among positive HIV test reports attributed to IDU in 2000 with age information, the highest proportion was among those aged 30-39 years (39.2%).

HIV Prevalence and Incidence Remain Unacceptably High among IDUs

- Results from a 1999 seroprevalence survey among 159 IDUs using the needle exchange program in Victoria, B.C., showed that 21% were HIV positive. This was significantly higher than the prevalence rate of about 6% found in a small study in the early 1990s.[4]

- Results from the Calgary Needle Exchange Program, Safeworks, showed the prevalence of HIV among IDUs has increased from 2.2% in 1992 to 3.3% in 1998.[5,6]

- Results from the Winnipeg Injection Drug Epidemiology (WIDE) Study found that the prevalence of HIV infection among IDUs has increased significantly from 2.3% in 1986-90 to 12.6% in 1998.[7]

- Results from the Vancouver Injection Drug Use Study (VIDUS) showed that HIV incidence was about 2 per 100 person-years in 2000.[8]

- The SurvIDU study has been ongoing since 1995 and consists of seven centres providing needle exchange services to IDUs in the province of Quebec, plus Ottawa. HIV incidence among repeat service attendees in the overall network has not decreased, being 4.7 per 100 person-years in 1997, 4.7 in 1998, 4.2 in 1999 and 5.3 in 2000. [9]

- The St Luc cohort study of IDUs in Montreal found an incidence of 3.5 per 100 person-years for the period January 1998 to April 2000.[9]

Women, Youth and Aboriginal Groups are Particularly at Risk for HIV Infection Through Injecting Drug Use

- Since 1995, approximately one third to one half of new HIV test reports among women have been attributed to IDU. Proportions among adult women in this category have been consistently higher than among adult men. For example, in 1999, the proportion among women was more than double that among men (47.5% vs 22.9%).[3] National HIV estimates recently published for 1999 indicate that about 54% of all new HIV infections among women were attributed to IDU.[2]

- In 2000, the proportion of positive HIV test reports among those in the 15-19 year age

group that were attributed to IDU was 31.8%[3] (considering only those reports with exposure category information).

- The incidence among street youth in the Montreal Street Youth Cohort Study was 0.72% in 1999. Factors most strongly associated with seroconversion were having had sex with an HIV-positive partner and having injected drugs.[10]

- Results from Phase II of the Enhanced Surveillance of Canadian Street Youth Study showed that 20% of participants (n=1733) had ever injected drugs. There was considerable regional variation with 10% in Halifax to 30% in Saskatoon to 35% in Vancouver.[11]

- Aboriginal persons are over-represented among IDU populations, and a larger proportion of Aboriginal HIV and AIDS cases are attributed to IDU than non-Aboriginal cases.[12]

Comment

A number of biases must be taken into account when interpreting the results noted above. HIV diagnostic data are limited to persons who present themselves for testing, and so trends in these numbers may be influenced by testing patterns or improved ability to remove duplicate tests. In addition, identifying information that accompanies HIV testing data is sometimes incomplete or inaccurate, and this may limit the usefulness of HIV data. Results of cohort studies are limited by selection biases, loss to follow-up, and problems with generalizability.

Despite these limitations, available data show that the HIV epidemic among IDUs in Canada continues to be a very serious problem, with the infection spreading in vulnerable populations and across geographic boundaries. Although the problem is best documented in larger cities, increasingly, it is now being seen outside major urban areas. Additional epidemiologic data are needed to better define the extent of the problem and to guide the development and refinement of effective prevention policies and programs. These data are especially needed for areas outside major urban areas and for Aboriginal populations. Given the geographic mobility of IDUs and their social and sexual interaction with non-users, the dual problem of injecting drug use and HIV infection is one that ultimately affects all of Canadian society.

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For more information, please contact:

Division of HIV/AIDS Epidemiology & Surveillance
Bureau of HIV/AIDS, STD and TB
Centre for Infectious Disease Prevention & Control
Health Canada
Tunney's Pasture, Postal Locator 0900B1
Ottawa, Ontario K1A 0L2

Tel: (613) 954-5169
Fax: (613) 946-8695

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Risk Behaviours Among Injecting Drug Users in Canada

At a Glance

- **The sharing of drug injecting equipment remains unacceptably high among IDUs.**
- **The level of reported, unprotected sexual intercourse is also high among IDUs.**
- **Needle exchange programs alone are not sufficient to prevent HIV transmission among IDUs and should be complemented with a range of appropriate additional services.**

Introduction

In 1999, 34.1% of the estimated 4,190 new HIV infections that occurred in Canada were among injecting drug users (IDUs).[1] In contrast, 46.7% of the estimated 4,200 incident HIV infections that occurred in 1996 were among IDUs.[2] While these data suggest that Canada has had some success in reducing HIV transmission among injecting drug users, IDUs nevertheless continue to be an important risk group in the Canadian HIV epidemic. In the absence of a vaccine for HIV, behaviour change remains the main tool for preventing HIV infection among drug injectors. Behaviour change concerns both IDUs who are HIV infected and those who are uninfected, and relates mainly to their injecting-related and sexual behaviour. This *Epi Update* briefly describes the drug injecting and sexual risk behaviours that have been reported for IDUs in Canada. Needle exchange programs, an important part of the prevention strategy to reduce HIV transmission among drug injectors in Canada, are also discussed.

Neither a Borrower Nor a Lender Be: The Sharing of Drug Injecting Equipment

The sharing (borrowing and lending) of needles and syringes is well-established as a means of HIV infection and is relatively common among IDUs:

- Among IDUs in a Montreal-based cohort study, 72.2% of male drug injectors and 75.4% of female IDUs reported, at study entry, that they had shared syringes in the past six months.[3]
- In an on-going study of IDUs recruited from needle exchange programs (NEPs) in Ottawa, Ontario and in the Province of Quebec, the prevalence of needle sharing in the past six months among first time NEP attendees in Montreal has decreased from 45.1% to 34.9%, and among repeat attendees in Quebec City, needle borrowing has declined from 43.4% to 34.8%. These results suggest that positive trends in IDU sharing behaviour may be occurring in these jurisdictions.[4]
- In a 1998 study of IDUs from Winnipeg, 42.0% of subjects reported that in the last year, they had injected with a needle that had been

previously used by someone else.[5]

The sharing of other injecting equipment (e.g., "cookers," filters, and water), often referred to as "indirect sharing," has also been found to be associated with HIV infection. Research suggests that indirect sharing occurs more frequently among IDUs than does multi-person use of needle/syringes:

- Among Ottawa NEP attendees, 42.0% of IDUs shared injecting equipment other than needles in the past six months, and 20.0% shared *only* injecting paraphernalia.[6]

- In a recent study in Prince Albert, Saskatchewan, 30.0% of current drug injectors (i.e., those who had injected drugs in the six months prior to the study) had borrowed cookers in the past six months, and the proportions that had borrowed filters and water in this same time period were 26.2% and 27.1% respectively.[7]

- International studies[8,9,10] of IDUs have identified other aspects of drug injecting, such as "front-loading" or "back-loading", that may also increase the risk of HIV transmission (This is a practice where two or more IDUs use only one syringe to prepare a drug solution. The solution is then squirted into one or more additional syringes either via the front of the recipient syringe after removing its needle (front-loading), or via the back after removing the plunger (back-loading)). However, the full extent of such risk behaviours among Canadian IDUs is still under investigation.

Needle Exchange Programs (NEPs): Good but Not a Panacea

- NEPs have been aptly described as a focal point for intervention. In addition to distributing sterile injection equipment, NEPs are a useful way of getting in touch with IDUs in order to educate and counsel them, and to connect this hard-to-reach population to health care services and drug treatment programs.

- Contrary to the arguments raised by some opponents of needle exchange, there is evidence that NEPs do not increase the number of IDUs in a region or city, or lower the age of first injection.[11, 12] Recent research also shows that NEPs do not encourage the formation of new social networks (and thus, new disease transmission networks) among drug injectors.[13]

- Some critics of NEPs argue that needle exchanges result in more contaminated syringes found on the street. Evidence suggests, however, that needle exchanges do not increase the number of needles discarded in a community or change the locations where needles are disposed.[14]

- A recent Montreal study estimated the number of syringes that would have had to have been available if all of that city's IDUs were to have used a sterile needle for each of their injections throughout 1994, and compared this figure with the number of syringes distributed by NEPs or sold by pharmacies during that year. The results showed that less than 5.0% of the need for sterile needles among IDUs in that city was actually met.[15]

- Most international studies report substantial declines in needle sharing among IDUs who use NEPs.[11,16] However, some researchers have found no difference in sharing behaviours between attendees and non-attendees have found greater declines in injection risk behaviours among IDUs who do not use such programs.[17,18]

- Despite concerns by some that NEPs may exacerbate the spread of HIV among IDUs, a growing body of research indicates that this is not, in fact, the case.[19,20,21] Although some studies have indeed reported an increased HIV prevalence and incidence among NEP attendees[22], this is likely due to the fact that NEP attendees are higher risk IDUs than are non-attendees.[20,23,24]

Risky Business: Trading Unprotected Sex for Money and Drugs

Many IDUs in Canada are involved in the commercial sex trade, and often engage in unprotected sex with clients:

- Among IDUs in Montreal, 18.1% of males reported that they had ever been a prostitute.[3]
- In a Winnipeg study, 71.5% of female IDUs and 30.2% of male IDUs reported that they had ever been paid for sex. Among females, 25.0% used condoms inconsistently with their sex trade clients. Among men with male clients, 52.0% reported inconsistent condom use.[5]

Not Safe Enough: Sex with Regular and Casual Partners

Among IDUs with regular and casual opposite-sex partners, condom use is also low:

- Among IDUs in Winnipeg, 68.0% of women and 57.0% of men who had had regular partners in the past year reported that they never used condoms. Of those who reported having had casual partners in this time period, approximately 30% of both men and women never used condoms.[5]
- In a cohort study of IDUs in Vancouver, only 25.2% of females and 18.4% of males at enrolment reported using condoms with a regular partner. Condom use with casual sex partners was also low with only 16.4% of female IDUs and 27.7% of male IDUs reporting condom use with this type of partner.[25]

Same Sex Partners and Male IDUs

A substantial minority of male IDUs report sexual intercourse with same sex partners:

- Among male IDUs who reported having had sexual intercourse in the past six months, 7.0% reported having had only same sex partners, and 6.0% reported having had partners of both sexes in this time period.[26]
- Of male IDUs recruited from NEPs throughout Quebec and in Ottawa, Ontario, 13.0% of subjects had had male sex partners in the past six months with few reporting consistent condom use.[27]

Protective Behaviour Changes or Higher Risk Practices Following an HIV Positive Test?

Evidence suggests that after receiving an HIV positive test, newly diagnosed IDUs require education and support to reduce their risk behaviours:

- Among IDUs in a Quebec study, 53.9% of HIV positive drug injectors had stopped sharing needles compared to 35.9% of their HIV negative counterparts in the six months following their HIV serostatus results. However, 18.2% of HIV positive IDUs compared to 6.4% of their non-infected peers began sharing needles with HIV positive partners in this same time period.[28]
- In a study of IDUs in Vancouver, 35.0% of subjects who were HIV positive reported that they borrowed needles prior to learning about their serostatus. In the months following their HIV positive test, only 21.0% of these subjects reported that they continued to borrow needles. Similarly, 37.0% of HIV positive IDUs reported needle lending prior to their positive HIV test; whereas, only 21.0% of these subjects continued this practice after receiving their positive test results.[29]

Injecting Drug Use Is a Problem Among Street Youth and Inmates

Appropriate and accessible HIV prevention programs for drug injecting street-involved youth and inmates are clearly needed:

- One-third of a sample of Montreal street youth had injected drugs in the previous six months.

Among those who were regular injectors, 47.0% had shared needles in this time frame.[30]

- Among female inmates in a Quebec prison, 38.0% reported injecting drugs before they were incarcerated, and about half of these women had shared needles. Of those who reported drug injection before going to prison, 11.0% admitted to injecting drugs during their incarceration, and most (80.0%) shared needles.[31]

- Among male inmates in this same study, 26.0% reported that they had injected drugs before being incarcerated, and about half of these had shared needles. Of those who admitted to injecting drugs outside prison, 2.0% reported injection drug use during their incarceration, and most (92.0%) shared needles.[31]

Comment

High-risk needle sharing and sexual behaviours continue to fuel the HIV epidemic among IDUs in Canada, and this group presently accounts for slightly more than a third of new infections in this country. Continued monitoring of risk behaviours among IDUs and of factors associated with these behaviours is critical, especially with respect to trends over time. This information is needed to help guide and evaluate prevention programs that target drug injectors. When assessing the evidence on the effectiveness of needle exchange programs (NEPs), it is clearly important to understand who constitutes the comparison group in studies that have evaluated NEPs. Although NEPs are an integral part of Canada's HIV prevention strategy for IDUs, exchange programs alone are likely not sufficient to prevent HIV transmission among drug injectors.[13,22] NEPs need to be complemented by appropriate and accessible health and social services, as well as detoxification and drug treatment programs. Street involved youth and inmates are special subgroups of IDUs that should receive priority in HIV prevention policies and programs in Canada.

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Oral Sex and the Risk of HIV Transmission

At a Glance

- **Unprotected oral sex has been associated with HIV infection in some studies.**
- **The actual risk of HIV transmission through oral sex is difficult to assess since research subjects may under-report higher risk sexual activities.**
- **Unprotected oral sex should be avoided in situations where HIV transmission is a possibility.**

Introduction

The risk of HIV transmission through unprotected anal and vaginal intercourse is well known. Estimates of the per-sex-act probability of HIV transmission among homosexual men in the U.S. through receptive penile-anal intercourse with ejaculation range from 0.005-0.03 during the asymptomatic phase of infection and the period leading to AIDS[1] to as high as 0.1-0.3 during primary HIV infection.[2] Analyses of data from North American and European studies of long- term heterosexual couples estimate the per-sex-act probability of HIV transmission through penile-vaginal intercourse to be approximately 0.001.[3] However, the independent risk of HIV transmission through orogenital contact has been more difficult to study and is less well understood. This report updates current information on oral sex and the risk of HIV transmission. Current recommendations on the use of condoms for oral intercourse are also reviewed.

Laboratory and Animal Studies: Evidence Links HIV Infection to Oral Intercourse in Humans

- A recent animal study found that the minimal dose of simian immunodeficiency virus (SIV) (a virus closely related to HIV-1) required to achieve infection in adult rhesus monkeys through oral exposure was 6,000 times lower than was the minimal dose needed to achieve infection after rectal exposure. The researchers concluded that as with oral exposure to SIV by rhesus monkeys, oral exposure to HIV-1 by humans likely carries the risk of infection.[4]
- In a laboratory study designed to explore the oral transmission of HIV by seminal fluid and colostrum, normal donor samples of human milk, colostrum, seminal fluid, and blood were separately combined with samples of saliva and HIV-infected white blood cells. All samples, in normal physiologic volumes, prevented saliva from inactivating the HIV infected blood cells, leading the researchers to conclude that successful oral transmission of HIV by seminal fluid, milk, and colostrum may occur.[5]

Oral Sex Between Homosexual Males: Not as Safe often Perceived?

Several epidemiological studies have examined the risk of HIV infection through unprotected receptive oral intercourse (receptive fellatio):

- In a 1996-1999 study of homosexual men recently diagnosed with HIV infection, it was found that 7.8% of subjects (8 of 102) were probably infected through receptive oral sex.[6]

- In a 1986-1988 prospective study of HIV infection and AIDS among homosexual men in the Netherlands, four of 102 cases of seroconversion (3.9%) likely occurred as a result of receptive oral intercourse.[7]

- In a 1990-1992 study of newly diagnosed HIV-infected gay men, six of 37 patients who had been infected within a year before testing claimed only receptive oral sex as the possible route of their infection.[8]

Several studies have also explored the possibility of HIV transmission through unprotected insertive orogenital intercourse (insertive fellatio) or insertive anogenital sex (insertive anilingus):

- In a prospective study of HIV infection among homosexual men in the Netherlands, five of 102 seroconverters (4.9%) may have been infected through insertive orogenital or anogenital intercourse.[7]

- In an early cohort study of homosexual men, two of five cases of HIV seroconversion were attributed to insertive orogenital sex.[9]

Additional studies, while not distinguishing the type of oral sex between homosexual men, further suggest the possibility of HIV transmission though oral-penile/oral-anal contact:

- In a study to describe the clinical and epidemiologic features of primary HIV infection, four of 46 patients reported having had only unprotected orogenital contact during the suspected sexual encounter that led to their seroconversion.[10]

- In a study of 741 homosexual men in the Netherlands, orogenital contact was identified as an independent risk for HIV acquisition, although this result was not statistically significant.[11]

- In a U.S. study, homosexual males who were participating in a hepatitis B study were found to have a higher risk of HIV infection from both orogenital and oroanal contact.[12]

- In the Omega cohort in Quebec, eight out of the 810 MSM participants were HIV positive at their baseline interview. Three of these men reported only unprotected oral sex as the possible route of their infection.[13]

Female-to-Female Transmission of HIV through Oral Intercourse: Truth or Bias?

- To date, there have been reports of HIV transmission through orogenital contact between lesbians (cunnilingus).[14] Several researchers have suggested, however, that bisexual activity may be under-reported by gay women, and that not all of the documented cases of female-to-female transmission of HIV infection are authentic.[15]

Possible Transmission of HIV between Heterosexual Partners as a Result of Oral Intercourse?

- There are several reported cases in the literature of women who acquired HIV infection after performing oral sex on their seropositive male partner (receptive fellatio).[16]

- Cases of infection in men following oral sex with their female partners have been reported, including one in which a man was apparently infected via fellatio involving a prostitute.[17,18]

Oral Lesions: A Potential Co-Factor for HIV Transmission during Oral Sex?

- In a 1996 cross-sectional study of crack cocaine smokers, oral lesions were associated with HIV infection among persons who reported receptive oral sex.[19]

- A 1993 study of female sex trade workers found that crack users who inconsistently used condoms when performing oral sex on their clients were more likely to be infected with HIV than were those who consistently used condoms when performing fellatio.[20]

- Of the eight homosexual men in the Options Project who may have acquired their HIV infection through receptive oral intercourse, three reported oral problems, including occasional bleeding gums.[6]

Oral Sex and "Safer Sex Counselling": Existing Views and Recommendations

- The Canadian AIDS Society (CAS) currently classifies insertive fellatio between men, or between women and men, as having a negligible risk of HIV transmission regardless of condom use. Receptive fellatio between men, or between men and women, is classified as having negligible risk if a condom is used and as low risk if a condom is not used (whether or not semen is taken in the mouth). CAS presently cautions that the risk of transmission from receptive fellatio is increased if lesions or sores are present in the mouth.[21]

- With respect to insertive cunnilingus between men and women or between two women, CAS regards this practice as having a negligible risk of HIV transmission if a barrier is used, and as low risk if no barrier is used (regardless of menstrual status). Receptive cunnilingus between men and women or between two women is regarded as having a negligible HIV risk.[21]

- Both insertive and receptive anilingus, with or without a barrier, between partners of the same sex or opposite sex, are viewed by CAS as having a negligible risk of HIV transmission.[20]

- CAS emphasizes that any risk of HIV transmission (or other STDs) from any of these types of oral intercourse can be effectively reduced by the proper use of a latex barrier (condom or dental dam) and thus advocates the avoidance of unprotected orogenital or oroanal contact.[20]

Conclusions

The risk of HIV transmission through oral sex is difficult to assess due to the fact that HIV seroconverters may under-report other higher risk sexual pratices. A recent literature review identified exposure to HIV through unprotected oral intercourse as an independent risk factor for HIV acquisition in only three (12.5%) of 24 epidemiological studies designed to examine risk of HIV from different sexual exposures.[22] Despite the relative lack of available information, the findings reported here support the recommendation that has already been made regarding the avoidance of any type of unprotected oral sex, particularly receptive fellatio, in situations where HIV transmission is a possibility.

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For more information, please contact:

Division of HIV/AIDS Epidemiology & Surveillance
Bureau of HIV/AIDS, STD and TB
Centre for Infectious Disease Prevention & Control
Health Canada
Tunney's Pasture, Postal Locator 0900B1
Ottawa, Ontario K1A 0L2

Tel: (613) 954-5169
Fax: (613) 946-8695

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HIV Strain Surveillance in Canada

At a Glance

- **The Canadian Strain and Drug Resistance Program (CHSDRSP) is a national surveillance program to monitor the diversity of HIV strains (subtypes) in Canada.**
- **Although HIV-1 subtype B continues to predominate, subtypes A, C, D, and the circulating recombinants A/E, A/B, and A/G have been identified in Canada.**
- **The overall prevalence of non-B HIV-1 subtypes in Canada is 9.1%.**
- **Prevalence of non-B HIV-1 subtypes in Canada varies between geographic regions and may be related to travel and/or migration from countries where divergent HIV strains predominate.**

Introduction

Two types of HIV have been characterized in humans, HIV-1 and HIV-2. Both HIV-1 and HIV-2 can lead to AIDS. HIV-2 is less common than HIV-1 and is mainly found in West Africa. HIV-1 can be divided into three major phylogenetic groups: "M" (major), "O" (outlier) and "N" (new).[1] The vast majority of isolates cluster in the "M" group. Based on sequencing the viral genes *env* and *gag*, ten different strains (subtypes) have been identified within this group (A-D, F1, F2, G, H, J, and K). However, not all subtypes within Group "M" are 'pure' since the recombinants or 'mixed' subtypes A/B, A/E, and A/G, have also been detected.[2] Of note, there continues to be a debate over the classification of the A/E recombinant. The nomenclature suggests this recombinant is a mosaic of subtypes A and E, however a 'pure' subtype E has not yet been found. The recombinant A/E has also been referred to as subtype E by some researchers. Subtypes A and C are the most common, accounting for about one-half of HIV-1 infections world-wide. In Canada, the United States and Western Europe, HIV-1 subtype B predominates. However, due to travel and migration, non-B subtypes are increasingly being reported in these parts of the world. This *Epi Update* provides a summary of the surveillance of HIV strains in Canada, and outlines the prevalence of divergent HIV strains in Canada, the United States, and Western Europe.

Why conduct HIV strain surveillance?

The Canadian HIV Strain and Drug Resistance Surveillance Program (CHSDRSP) was initiated as part of an integrated group of projects aimed at enhancing the national surveillance of HIV. Through a collaborative approach between the provinces, territories, and the Bureau of HIV/AIDS, STD and TB (BHST), laboratory samples (serum from newly diagnosed HIV-positive individuals or plasma taken for the purpose of first viral load testing) and corresponding epidemiological data are sent from the Provincial Health Laboratories to the BHST. The results are then shared with the

provinces and territories. One of the central goals of this program is to conduct the systematic surveillance of HIV subtypes to better understand the epidemiology of HIV in Canada. Specifically, the strain surveillance program has four main objectives:

1) ***Improve HIV diagnostics and screening strategies***

The broad genetic diversity of HIV has implications for the ability of diagnostic tests to reliably detect circulating HIV strains.[3] Based on the knowledge of circulating HIV strains and extensive laboratory testing of samples from individuals with unusual clinical presentations and/or unusual serological, PCR, or viral culture results, modifications can be made in current tests to ensure that all HIV positive persons are detected upon testing. This is also relevant for ensuring the safety of the blood supply since the tests used for screening donated blood should be able to detect circulating HIV variants.

2) Inform vaccine development

It is important to know the distribution of the viral subtypes and intrasubtype variation to target vaccine development and testing since the efficacy and effectiveness of vaccines may be subtype-specific.[3]

3) Assess HIV transmission patterns

Although genetic analyses have been used to assess the spread of HIV globally[3], there is little consensus on whether differences in HIV affect transmission rates. Whereas some studies suggest lower rates of sexual and maternal transmission of HIV-2 compared to HIV-1[4,5], other studies do not note such differences.[6,7] Some studies note differences in the biological properties of HIV-1 subtypes[8,9], however, this needs to be confirmed. Knowing the distribution of HIV variants in Canada, along with corresponding epidemiological factors, will help to assess the implications of any differences in transmissibility. The public health implications of such findings, including prevention and treatment strategies, are of special interest.

4) Assess HIV pathogenesis and progression of HIV-related diseases

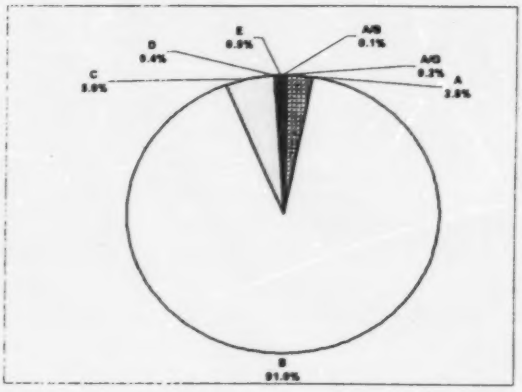
Although the rate of HIV-related disease progression is affected by many factors including host factors, the evidence suggests that the immunologic responses may be less suppressed by HIV-2 than by HIV-1[10,11]. Although some studies suggest genetic subtypes play a role in disease progression[3], other studies suggest the reverse and this area is in need of further investigation.

Distribution of HIV-1 Subtypes

Canada:

- Results from CHSDRSP show that 9.1% of the sampled population (n=815) were infected with non-B subtypes (See Figure 1 for subtype distribution)[12].

Figure 1: Distribution of HIV-1 Subtypes



- Preliminary results from CHSDRSP suggest a significant proportion of individuals infected with a non-B HIV-1 subtype are of African or Asian origin, and/or identify heterosexual sex as their primary risk factor.[12] These correlations are likely due to travel and migration from endemic areas where divergent HIV-1 subtypes predominate and where heterosexual sex is a major risk factor for HIV-1 infection.

- In 1995, HIV-1 subtype A was reported in an African born male who moved to Canada in 1983.[13]

- The BC Centre for Excellence in HIV/AIDS has conducted genetic analyses of HIV linked to cohort studies and to the BC HIV drug treatment program. These studies suggest that non-B subtypes in BC represent at least 4% of HIV infections among individuals starting therapy.[14] HIV-1 subtypes A, C, and D have been identified.

- HIV-2 was detected in Canada as early as 1988[15] and, and the systematic surveillance of HIV subtypes includes surveillance for HIV-2.

Existing studies on high-risk populations suggest that HIV-1 subtype B is the most common subtype found in the country.

- In 1998, serological samples from 31 HIV positive persons of both genders, representing approximately 25% of known HIV positive persons in Newfoundland, were all of HIV-1 subtype B.[16]

- In 1999, all HIV-1 sequences analysed among infected injection drug users (n=17) and men who have sex with men (n=5) residing in Montreal[17] were of subtype B.

- As of November 2000, all samples of 31 recent seroconverters in the POLARIS cohort in Ontario are of subtype B.[18]

United States:

- As early as 1993, subtype D was reported in the United States.[19]

- Results from CDC's ongoing sentinel surveillance of strain and drug resistance has found 1.6% of persons newly diagnosed with HIV were infected with subtype A (n = 321).[20]

- A prospective study conducted in 1998, found 12% of recent military seroconverters were infected with the non-B HIV-1 subtypes (8% A/E, 4% B/F, n=76). All but one of these individuals reported heterosexual contact with someone outside the U.S. during their seroconversion window period.[21]

- In another cohort study of 88 treatment-naive individuals presenting to a Boston hospital in 1999, nine (10%) were infected with non-B HIV-1 (subtypes A and C, and the recombinants A/E and A/G). All these individuals were born outside the U.S.[22]

- In a population-based study of HIV-infected individuals identified as being at increased risk for group "O" infection (based on country of birth, n = 155), two cases of group "O" infection and 27 cases of non-B, group M infection were identified. Both cases of group "O" infections were in individuals born in Africa.[23]

Western Europe:

- A rising prevalence of HIV-1 non-B subtypes a has been reported in Western Europe.[24]

- Group "O" HIV, which is most commonly found West Africa, has been identified in Western Europe including countries such as Norway[25], Spain[26], and France[27].

- Recombinant strains of HIV-1 have also been detected in countries including the UK[28], Spain[29], and Greece[30].

Comment

The diversity of variant HIV strains in Canada will invariably challenge existing diagnostic tests and interpretation algorithms. Depending on the impact that subtypes have on vaccine effectiveness and efficacy, it may also influence the course of future vaccine research and testing. And, depending on future findings related to subtype-specific transmissibility, pathogenicity and treatment, it may play a role in changing the nature of the HIV epidemic in Canada. It is therefore important to implement the systematic collection and analysis of data related to strain surveillance across Canada.

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Primary HIV Anti-retroviral Drug Resistance in Canada

At a Glance

- **The Canadian HIV Strain and Drug Resistance Program conducts national surveillance for primary drug resistance.**
- **Preliminary observations on the prevalence of HIV-1 primary drug resistance in Canada suggest:**
  - **The overall prevalence of primary resistance, to at least one anti-retroviral drug, is between 4.6-20%**
  - **Multi-drug primary resistance has been observed, with an overall prevalence of between 0.3-9.9%**

Introduction

While drug resistance among individuals on treatment (secondary drug resistance) is well documented, resistance seen in treatment-naive individuals, presumably due to the transmission of a drug-resistant variant of HIV-1 (primary drug resistance) is less well studied. This *Epi Update* provides a summary of how drug resistance arises, how drug resistance is identified, and key studies on the prevalence of primary drug resistance in countries where highly-active anti-retroviral therapy (HAART) is widely used.

Why Conduct Primary Drug Resistance Surveillance?

Although HAART has led to a reduction in HIV-1 related morbidity and mortality in Canada and some other countries, there is a concern that its widespread use, increased number of treatment failures, and high HIV-1 infection rates may result in increased transmission of drug-resistant virus. The first case of primary drug resistance was reported in 1993 with the transmission a zidovudine-resistant HIV-1 strain[1]. Since then many reports of transmission of drug resistant HIV strains have been published. [For an overview of these studies see a review by Wainberg & Friedland (1998)[2]].

What is less well understood is the prevalence of primary drug resistance and the variation of this prevalence over time, geographic area and population risk group. The Canadian HIV Strain and Drug Resistance Surveillance Program (CHSDRSP) aims to address these questions and the resulting information can be used to develop guidelines for initial therapeutic regimens and to develop more effective HIV prevention strategies, including the prevention of vertical transmission.

Evolution of Drug Resistance

Viral resistance develops largely due to mutations in the genes encoding the HIV reverse transcriptase (RT) and protease enzymes. Both these enzymes are required for viral reproduction and current anti-retroviral drugs interact with these enzymes to impede their activity. Current drugs include the

nucleoside analogue reverse transcriptase inhibitors (NRTIs), the non-nucleoside reverse transcriptase inhibitors (NNRTIs), and protease inhibitors (PIs). Mutations in the genes encoding RT and protease can alter these enzymes so as to diminish this interaction and undermine the ability of the drugs to impede viral replication.

Mutations in HIV virus are largely a result of rapid replication (in an established infection, an estimated 10 billion virions are produced per day[3]) and the error-prone activity of RT estimated to introduce an average of one nucleotide substitution each time the virus replicates[4]. Most mutations are lethal or neutral and the wild type strain usually dominates because it replicates more efficiently[5]. However, it is possible for every single drug-resistant mutation to be generated daily[6]. Under conditions where treatment does not completely inhibit viral replication, virus harbouring drug resistant mutations can be selected and can proliferate resulting in treatment failure[6]. In the case of primary drug resistance, drugs that permit the growth of existing resistant strains will fail. For some drugs a single mutation is associated with a high level of drug resistance. This is also known as a primary mutation. For example, the replacement of methionine to valine at position 184 of RT (M184V) is associated with resistance to 3TC (lamivudine). For other drugs (ex: most PIs), a combination of secondary mutations is required[6].

Methods to Identify Drug Resistance

Genotypic tests identify mutations in the viral genome through commercially available probes for particular mutations or via sequencing viral genes of interest. Resistance is identified by comparing the generated sequences to databases containing algorithms to assess resistance-conferring mutations. For a review of primary and secondary mutations see Hirsh *et al* (1998)[6].

Phenotypic tests determine the enzymatic activity of viral genes or assess viral growth in increasing concentrations of drugs. Resistance is usually defined when, compared to the wild type strain, four or more times the amount of drug is required to inhibit viral growth by 50%. This test is similar in concept to antibiotic resistance testing in bacterial culture.

Note: Genotypic and phenotypic testing and interpretation are evolving fields that are extremely complex, requiring expert inputs.

Summary of Key Studies on the Prevalence of Primary Drug Resistance

It is difficult to make inter-study comparisons and arrive at firm conclusions because of differences in study design including study populations, types of resistance testing used, and mutations studied and reported. However, the following general trends seem to be emerging:

- Results from cohort and cross-sectional studies suggest that in Canada, the overall prevalence of primary resistance to at least one anti-retroviral drug is between 4.6-20% (Table 1).
- Multi-drug primary resistance has been observed in Canada, and preliminary studies suggest an overall prevalence of between 0.3-9.9% (Table 1).
- Between 1997-1999 in Switzerland, primary drug resistance seems to be decreasing (Table 2). However, further data are needed to confirm this trend and to understand the factors affecting the trend
- Between 1994-2000 in the UK, the risk of being infected with drug resistant HIV-1 seems to be increasing (Table 2). However the sample size is small (n=69) and more data are required to confirm this trend.

Table 1: Summary of key studies on HIV-1 primary drug resistance in Canada

Province	Year	Study Population	Clinical Status	Sample size	RTIs[+] %	PIs[+] %	MDR[+] %	Total
BC[7]	'97-'98	mixed RF	ND	423	4.6 (n=416)	4.6		
QC[8]	'97-'99	IDU (26%) Sexual (69%)	RHI	81	20	6	9.9	
ON[9]	'97-'99	MSM	RHI	23	13			
BC, AB, SK, MB, ON, NF[10]	'97-'00	mixed RF	RHI/ND	374	5.3	2.2	0.3	7.3
QC[11]	'99-'00		RHI	61		6.5	3.2	26

Table 2: Summary of key studies on HIV-1 primary drug resistance in Europe and the Unites States

Country	Year	Study Population	Clinical Status	Sample size	RTIs[*+] %	PIs[+] %	MDR[+] %	Total
France[12, 13]	'95-'98	mixed RF	RHI	48	16.6	2		
	'99	MSM/BI (71%)	RHI	108	6.5 (NRTI) 3.7(NNRTI)	3	0.9	
Italy[14]	'96-'98	mixed RF	RHI	68	16.2	6	4.4	
Spain[15, 16]	'98	mixed RF	RHI	126	17 (NRTI) (n=52)	6		
	'97-'99	mixed RF	RHI	52	13.5 (NRTI)			
Switzerland[17]	'96	mixed RF	RHI	36	5.6	3		8.6
	'97	mixed RF	RHI	40	10	9		14.6
	'98	mixed RF	RHI	62	7.1	2		8.8
	'99	mixed RF	RHI	59	3.4	2		5
UK[18]	'94-'96	mixed RF	RHI	21	0	0	0	0
	'97-'99	mixed RF	RHI	22	13.6	0	0	13.6
	'00	mixed RF	RHI	26	19.2	3.8	0	23
USA[19, 20, 21,22]	'89-'98	MSM (80%)	RHI	141	0.7 (NNRTI)	1.4	1.4	2.1
	'95-'99	MSM (94%)	RHI	80	12.5 (NRTI) 7.5 (NNRTI)	3	3.8	16.3
	'97-'98		RHI	114	4 (NRTI) 15 (NNRTI, n=95)	10	5	22
	'97-'99	mixed RF	RHI/ND	437		1	1	10

***Note:** Differentiation into NNRTI and NRTI is given only when % total RTI was not provided

[+]Note: Only primary drug resistance mutations are identified

Key to abbreviations

Province: BC=British Columbia, QC=Quebec, AB=Alberta, SK=Saskatchewan, MB=Manitoba, ON=Ontario, NF=Newfoundland
Study Population: RF=risk factors, IDU=injecting drug user, MSM=men who have sex with men, BI=bisexual
Clinical Status: ND=date of infection not determined, RHI=recent HIV-1 infection (within the past 6-18 months)
RTIs=reverse transcriptase inhibitors
PIs=protease inhibitors
MDR=multi-drug resistance

Comment

The transmission of drug resistant HIV strains is becoming more widespread in most countries where HAART is used. Although the interpretation of results is difficult and evolving, persons infected with drug resistant variants of HIV may be at increased risk of drug failure despite being therapy-naïve. Surveillance of primary drug resistance is needed not only to develop guidelines for initial therapy, but also to better understand and prevent the transmission of resistant variants

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For more information, please contact:

Division of HIV/AIDS Epidemiology & Surveillance
Bureau of HIV/AIDS, STD and TB
Centre for Infectious Disease Prevention & Control
Health Canada
Tunney's Pasture, Postal Locator 0900B1
Ottawa, Ontario K1A 0L2

Tel: (613) 954-5169
Fax: (613) 946-8695

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Nonoxynol-9 and the Risk of HIV Transmission

At a Glance

- **Nonoxynol-9 should not be promoted as an effective means of HIV prevention.**
- **Recent data indicate that Nonoxynol-9 does not reduce the risk of HIV transmision infection and may in fact increase the risk.**
- **Development of effective anti-HIV microbicide is a public health priority.**

Introduction

The purpose of this *Epi Update* is to summarize recent data on the effectiveness of nonoxynol-9 as a microbicide, with particular reference to its effect on HIV transmission. While the effectiveness of nonoxynol-9 as a spermicide is well know, its usefulness as a microbicide is less clear, and in fact recent data indicate that nonoxynol-9 may actually increase the risk of HIV transmission. This *Epi Update* examines the implications of these data in the context of HIV prevention efforts.

Background

Microbicides are chemical substances that kill viruses and bacteria, and they have the potential to reduce the transmission of HIV and other sexually transmitted pathogens when applied vaginally or rectally before sexual intercourse. The development of an effective microbicide is an important research objective since it would not only improve the effectiveness of condoms in preventing disease transmission, but more importantly would offer an alternative for women to protect themselves without having to obtain the cooperation of their male sexual partner (in contrast to the male condom). Such an alternative would be especially welcome since the vast majority of global HIV transmissions occur via heterosexual activity.

Nonoxynol-9 (N-9) is one of the best studied candidate microbicides for the prevention of HIV and other sexually transmitted infections. N-9 was initially developed as a spermicide, a chemical that kills sperm and therefore prevents pregnancy. These chemicals are used in contraceptive spermicide products and as complementary components in the lubricant of barrier methods of contraception, such as the male condom. Studies have demonstrated that when spermicides are used alone, they are 75-85% effective in preventing pregnancy.[1,2] In addition, N-9 has also been identified as a compound that can kill viruses and bacteria, and so has been proposed as a candidate microbicide for HIV prevention. Laboratory studies have shown that N-9 kills or stops the growth of the HIV virus as well as the pathogens of other sexually transmitted infections such as genital herpes, gonorrhea, syphilis, trichomoniasis and Chlamydia.[3]

A number of products containing N-9 are licenced for use as spermicides in both the United States and Canada. These products are available without a prescription and come in a variety of forms,

including creams, films, foams, gels, suppositories, and as lubricants on spermicidal condoms. In Canada, N-9 is found in the following contraceptive products: Advantage 24 contraceptive gel, Delfen foam, vaginal contraceptive film (VCF), KY Plus Jelly spermicidal lubricant, Protectaid contraceptive sponge, and Emko, Encare, Ramses and Durex brands of condoms with spermicide. However, in Canada at present, there are no products with N-9 that are licensed or indicated for use as microbicides.[4]

Evidence Regarding Nonoxynol-9 and HIV Transmission

Clinical trials have found that N-9 can cause inflammatory changes and disruptions of mucosal surfaces when it is applied to the rectum or vagina. These mucosal changes and disruptions may act as portals of entry for HIV and agents of other sexually transmitted pathogens.[5] Studies have also indicated that these adverse effects of N-9 are dose related, supporting the notion that a potentially narrow margin of safety may exist for N-9.[6]

While laboratory studies clearly indicated that N-9 could be an effective barrier to HIV, clinical trials in humans have produced mixed results. Several observational studies have indicated that N-9 may reduce the risk of HIV transmission, but the study design did not permit definitive conclusions.[7-9] A meta-analysis investigation that combined data from several studies concluded that N-9 may have a protective effect against both gonorrhea and chlamydia, but was not able to make a definite conclusion regarding the protective effect on HIV.[10] A recently-published cohort study found no evidence of N-9 protection against HIV,[11] similar to the results of two controlled trials on this subject. One trial found no significant protection but a higher incidence of genital ulcers in the N-9 group compared to the control group,[12] and another trial found increased HIV infections in the N-9 group compared to the control group though this difference was not statistically significant.[13]

The most significant recent data are from two studies presented at the 13th International AIDS Conference in Durban, July, 2000. A study sponsored by UNAIDS was presented in which female sex trade workers at high risk for HIV infection were encouraged to use condoms along with a vaginal gel for intercourse. Half of the women used a placebo (inactive or control) gel and the other half used N-9 gel. The result was that the HIV infection rate in the N-9 group was 50% higher than in the control group (15.5 versus 10.2 infections per 100 person-years), and the difference was statistically significant.[14] Furthermore, infection rates of gonorrhea and Chlamydia were also higher in the N-9 group, though these differences were not statistically significant. The likely explanation for the increased HIV infection rate is the higher frequency of genital lesions found in the N-9 group (19% versus 13%).[14] It is worthwhile to note that the group using condoms with N-9 gel had lower HIV infection rates than sex workers not in the study (who had lower overall rates of condom use).

The association between N-9 and genital lesions was also seen in a study of monogamous, low risk women who had a much lower frequency of sexual intercourse than the sex workers in the UNAIDS study. In this second study, women applied a vaginal N-9 gel or a placebo gel twice daily, and the N-9 group had significantly more vaginal itching, burning and mucosal lesions.[15] While it is difficult to extrapolate the findings of these two studies to the general population in terms of sexual frequency and dosage and mode of N-9 use (including the occasional use of an N-9 lubricated condom), the theoretical benefits of N-9 use in such situations would have to be weighed against the demonstrated potential for harmful side effects.

Comment

Taken together, the recent evidence is convincing that frequent use of N-9 does not reduce the risk of infection by HIV, and may in fact increase the risk by causing disruptions and lesions in the genital mucosal lining. There are currently no data available to address the question of whether these results also apply to situations in which the dosage and/or frequency of N-9 use is lower. To address

this question and to discuss the complete analyses of data from the UNAIDS study[14] and of additional data from a USAID-funded study,[12] WHO is expected to host a conference on N-9 in October, 2001. Nonetheless, based on data currently available, recommendations on the use of N-9 for HIV prevention may need to be re-evaluated. Health Canada has never recommended N-9 on its own as an effective means of HIV prevention. Current assessment of the data indicates that:

- N-9 should not be promoted as an effective means of HIV prevention. In particular, individuals who cannot use a condom for HIV prevention should not be counseled to use N-9 as an alternative.

- The best STD and HIV barrier is a latex condom without N-9. However, a condom lubricated with N-9 is better than no condom at all. The protection provided by the condom would appear to outweigh the potential risk of the N-9.

- If N-9 is used as an aid to contraception, its benefit should be carefully considered in light of the increased risk of genital lesions and the resulting potential for an increased risk of HIV transmission.

Similar recommendations have been released from the Centers for Disease Control and Prevention in the USA.[16, 17]

Future directions

These disappointing data on the ineffectiveness of N-9 as a microbicide serve to further reinforce the importance and urgency of research on the development of other possible compounds as microbicides. Other classes of compounds that show promise include topical non-nucleoside reverse transcriptase inhibitors (such as efavirenz), inhibitors of viral attachment (such as cellulose sulphate), and natural products (such as buffer gels). For individuals who are unable to access condoms or negotiate condom use, particularly women, there is an urgent need to identify safe and effective alternatives in HIV prevention. Thus the development and evaluation of potential microbicides is a public health priority.

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For more information, please contact:

Division of HIV/AIDS Epidemiology & Surveillance
Bureau of HIV/AIDS, STD and TB
Centre for Infectious Disease Prevention & Control
Health Canada
Tunney's Pasture, Postal Locator 0900B1
Ottawa, Ontario K1A 0L2

Tel: (613) 954-5169
Fax: (613) 946-8695

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